Distribution and Biology of Pacific Hake and Walleye Pollock off the West Coast of Vancouver Island and the State of Washington. (August 15-September 5, 1983)

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DISTRIBUTION AND BIOLOGY OF PACIFIC HAKE AND WALLEYE POLLOCK OFF THE WEST COAST OF VANCOUVER ISLAND AND THE STATE OF WASHINGTON. (AUGUST 15-SEPTEMBER 5, 1983)

by

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ABSTRACT

Shaw, W., G. A. McFarlane, J. R. Scarsbrook, M. S. Smith, and W. T. Andrews. 1985. Distribution and biology of Pacific hake and walleye pollock off the west coast Vancouver Island and the State of Washington. (August 15-September 5, 1983). Can. MS Fish. Aquat. Sci. 1825: 128 p.

A biological survey of Pacific hake (Merluccius productus) and walleye pollock (Theragra chalcogramma) was conducted during August-September 1983 off the southwest coast of British Columbia and the northwest coast of the State of Washington (48°-49°N Lat.). The objective of the survey was to assess the "resident" stocks in coastal inlets; and the "migratory" offshore Pacific hake stock. Small Pacific hake (modal length at 22 and 32 cm) and walleye pollock (modal length at 12 and 23 cm) were found in the coastal inlets (Barkley Sound, Sydney Inlet, and Nootka Sound). Pacific hake captured offshore in Canadian waters were larger than those in U.S. waters.

The dominant age groups were 3 and 6 (1980 and 1977 year-classes), with 6+ yr-old hake dominating (50%) the catches in the Canadian waters and 3+ yr-old hake (75%) in the U.S. waters.

The length at 50% maturity for male and female Pacific hake in the offshore waters was 36.5 cm and 41.9 cm, respectively. A length weight relationship for offshore Pacific hake is: Wt (gm) = 0.0042 (FL(cm))3.1097.

Walleye pollock were not abundant in the offshore waters nor were they abundant in the inlets. The 1980 year-class (age 3+) was dominant accounting for 51% of all walleye pollock sampled in the Canadian waters and 75.0% in the U.S. waters. Estimates of total mortality was higher for males (Z = 0.78) than for females (Z=0.71). The length at 50% maturity for male pollock was 38.9 cm and 41.2 cm for females.

Key words: Pacific hake, walleye pollock, biology, coastal inlets, offshore Vancouver Island, Washington State

RÉSUMÉ

Shaw, W., G. A. McFarlane, J. R. Scarsbrook, M. S. Smith, and W. T. Andrews. 1985. Distribution and biology of Pacific hake and walleye pollock off the west coast Vancouver Island and the State of Washington. (August 15-September 5, 1983). Can. MS Fish. Aquat. Sci. 1825: 128 p.

Une étude biologique du merlu du Pacifique (Merluccius productus) et de la morue du Pacifique occidental (Theragra chalcogramma) a été effectuée en août et septembre 1983 au large de la côte sud-ouest de la Colombie-Britannique et de la côte nord-ouest de l'Etat de Washington (48-49° de latitude nord). Le but de l'étude était d'évaluer les stocks qui résident dans les bras de mer côtiers de même que le stock migrateur de merlus du Pacifique au large. On a trouvé dans les bras de mer de la côte (baie Parkley, inlet Sydney et baie Nootka) de petits merlus du Pacifique (longueur modale de 22 à 32 cm) et de petites morues du Pacifique occidental (longueur modale de 12 à 23 cm). Les merlus du Pacifique capturés au large dans les eaux canadiennes étaient plus grands que ceux capturés dans les eaux américaines.

Les groupes d'âge dominants étaient 3 et 6 (classes d'âge de 1980 et de 1977), les merlus âgés de 6+ constituant la plus grande partie (50%) des prises dans les eaux canadiennes et ceux âgés de 3+ (75%) dans les eaux américaines.

La longueur à laquelle 50% des merlus de Pacifique mâles et femelles avaient atteint la maturité en haute mer était respectivement de 36.5 et de 41.9 cm. La relation longueur-poids trouvée pour les merlus du Pacifique résidant en haute mer est la suivante: Pds (gm)= 0.0042 (LF(cm)) 3.1097.

Les morues du Pacifique occidental n'étaient pas nombreuses au large ni dans les bras de mer. La classe d'âge de 1980 (3+ ans) dominait, représentant 51% de toutes les morues du Pacifique occidental échantillonnées dans les eaux canadiennes et 75% de celles prélevées dans les eaux américaines. Les estimations de la mortalité totale étaient plus élevées pour les mâles (Z = 0.78) que pour les femelles (Z = 0.71). La longueur à laquelle 50% des morues avaient atteint la maturité était de 38.9 cm pour les mâles et de 41.2 cm pour les femelles.

Mots-clés: merlu du Pacifique, morue du Pacifique occidental, biologie, bras de mer côtiers, large de l'Île Vancouver, État de Washington

INTRODUCTION

In 1983, the Groundfish program of the Pacific Biological Station undertook a joint biological and hydroacoustic survey to examine the biology, distribution and abundance of Pacific hake (Merluccius productus) and walleye pollock (Theragra chalcogramma) off the southwest coast to Vancouver Island and the northwest coast of the State of Washington. The purpose of the survey was twofold: to assess "resident" stocks in coastal inlets off Vancouver Island; and to examine the "migratory" offshore stock of hake. This report summarizes information on fishing locations, catch composition and preliminary biological analyses.

Results of the hydroacoustic survey conducted cooperatively with the National Marine Fisheries Services (NMFS), Seattle, Washington are reported by Barner et al. (1984).

METHODS AND MATERIALS

FISHING

The R/V G.B. REED, used during the inlet portion of the survey, is a 54 m (177 ft) side trawler, powered by a 1000 BHP diesel engine. A 21.3 m (70 ft) Gulf semi-balloon shrimp bottom trawl, equipped with a 3.8 cm (1.5 in) mesh codend, was fished in the coastal inlets. Set locations were distributed in areas that were considered trawlable as determined by echo-sounding.

The F/V MARWOOD, used for the offshore portion of the survey, is a 39 m (128 ft) commercial stern trawler, powered by a 750 BHP diesel engine. Two Canadian midwater trawls were fished during the offshore survey. Each was equipped with an ELAC cable net sounder system and a LAZ 17 headrope transducer. The first 36 tows were fished using a Diamond 5B(D5) midwater trawl. The mesh in the codend measured 4.0 cm (1.6 in). A Diamond 8 (D8) midwater trawl was used for the remaining four tows and the mesh in the codend measured 8.9 cm (3.5 in). Set locations were selected in areas along a series of tracklines spaced 2.5 M apart laid out roughly perpendicular to bottom depth contours. The series of tracklines encompassed an area from latitudes 48°N to 49°N. The fishing positions, as determined from subjective density estimates of fish concentration as seen on the echo-sounder, were selected to identify and estimate species composition of the midwater concentrations.

SAMPLING

All bottom and midwater trawl catches were sorted by species into 55 L (12 gal) galvanized tubs which were weighed on a platform balance to the nearest kilogram. Small catches were sampled in their entirety, while a representative subsample was taken from larger catches. The major species, Pacific hake and walleye pollock, were measured for fork length and examined for sex, maturity state, and stomach contents. Stratified samples of hake from selected tows were individually weighed to the nearest gram using a Digimetric 30 DTI top loading balance equipped with a digital integrator. Paired otoliths from hake and the left pectoral fin from pollock were collected for age determination as outlined in Beamish (1979 and 1981a, respectively).

Incidental catches of spiny dogfish (Squalus acanthias) were examined for sex and measured for total length, from the tip of the snout to the tip of the upper lobe of the caudal fin when depressed in a line horizontal with the body. A sample of bocaccio rockfish (S. paucispinis) was measured for fork length and sexed.

Samples of Pacific hake, Pacific herring (Clupea harengus pallasi) and plankton were collected for other investigations.

Water temperature (°C) profiles were collected at pre-selected stations off Vancouver Island using expendable bathythermographs (XBT). Sea surface temperatures were taken from a bucket sample and were used to correct the final XBT readings.

RESULTS

CRUISE SUMMARY

Coastal Inlets of Vancouver Island

During August 15-21, the R/V G.B. REED completed 1 midwater tow off Swiftsure Bank and 10 bottom tows in 3 coastal inlets on the west coast of Vancouver Island: Barkley Sound, Sydney Inlet, and Nootka Sound (Fig. 1). The bottom tows ranged in depth from 59-165 m (32-90 fath). A total of 24 fish species and 5 invertebrate species were captured. Detailed catch data by set is presented in Appendix table 1.

Pacific hake was the most abundant species caught (28% of the total catch), and was present in every tow (Table 1). Largest catches were made in Sydney Inlet (sets 7 and 8) between 59-68 m (32-37 fath) and in Barkley Sound (set 4) at 53 m (97 fath). Bottom trawl catch rates of Pacific hake and walleye pollock were weighted by vessel speed over the bottom to express catch rate in kg/hr at 3.0 kt (5.6 km/h). The catch rates of Pacific hake ranged

from 58-408 kg/hr ($\bar{X}$=165 kg/hr) in Barkley Sound; 26-856 kg/hr ($\bar{X}$=531 kg/hr) in Sydney Inlet; and 9-16 kg/hr ($\bar{X}$=14 kg/hr) in Nootka Sound. Ratfish (Hydrolagus colliei) and spiny dogfish were abundant and present in the majority of the tows. Walleye pollock was not abundant (<2% of the total catch), but were present in a majority of the tows. The catch rates of walleye pollock ranged from 2-38 kg/hr ($\bar{X}$=15 kg/hr) in Barkley Sound; 0-39 kg/hr ($\bar{X}$=13 kg/hr) in Sydney Inlet; and 5-6 kg/hr ($\bar{X}$=6 kg/hr) in Nootka Sound.

West Coast Vancouver Island and Washington State

During August 25-September 5, the F/V MARWOOD completed a total of 40 midwater tows of which 13 (sets 15-26, and 28) were in U.S. waters off the Washington coast. One tow (set 14) was completed in Juan de Fuca Strait (Fig. 1). Sets completed in the Canadian waters were distributed throughout designated offshore management areas: 5-1A, 5-1B and 5-2 (Fig. 1). Echo soundings of the midwater concentration layer at each fishing position were categorized as: light (L), medium (M), and heavy (H) (Figs. 2, 3, and 4, respectively). In some areas heavy concentrations of fish were seen on the echogram to form a "saw-tooth" type configuration (Fig. 5). The concentration layer of fish did not appear to be depth specific and ranged in midwater depths from 27-182 m (15-100 fath) in Canadian waters, and 59-251 m (32-137 fath) in U.S. waters.

A total of 19 species of fish were captured during the offshore survey. Detailed catch data by set is presented in Appendix table 2. Pacific hake was the most abundant (84% of the total catch) species caught and was present in 78% of the tows (Table 1). The largest catches of hake were made in Canadian waters in area 5-1A (sets 35, and 37-40) at a depth of 115 m (63 fath) and from 68-128 m (37-70 fath), respectively. The largest catch of hake in U.S. waters was set 22 at depths from 128-130 m (70-72 fath). The highest catch rates during the survey were associated with the heavy (H) concentration layer. A comparison of the catch rates of Pacific hake by subjective density estimates is presented in Table 2. Pacific hake in Canadian waters were concentrated in midwater depths from 110-145 m (60-79 fath), and from 73-109 m (60-90 fath) in U.S. waters (Table 3). The mean catch rate of hake using the D5 net was 2367 kg/hr in Canadian waters and 3395 kg/hr in U.S. waters.

Walleye pollock were predominately found in Canadian waters with the largest catch off Swiftsure Bank (set 13) at a depth of 84 m (46 fath) in a medium (M) concentration layer. However, they were not abundant and remained an incidental catch during the survey.

A list of the common and scientific names of the species identified during both cruises is presented in Appendix table 3.

TEMPERATURE PROFILES

A total of 23 XBT stations were occupied along 4 transects between Swiftsure Bank and Nootka Sound (Fig. 6). Sea surface temperatures for offshore waters off Barkley Sound area ranged from 12.2°-16.8°C; 11.9°-16.0°C off Clayoquot Sound area; and 13.2°-14.6°C off Nootka Sound area. In all areas the warmest surface waters were found over the deeper offshore shelf areas (Fig. 7, 8 and 9, respectively). Bottom temperatures ranged from 5.8°-9.8°C with the colder bottom water occurring seaward of the 91 m (50 fath) isobath. From the temperature profiles, it appears that Pacific hake concentrate in a temperature regime from 7.5°C-9.5°C.

PACIFIC HAKE

Coastal Inlets of Vancouver Island

A total of 2337 Pacific hake were sampled from all sets from the three inlets: Barkley Sound, Sydney Inlet, and Nootka Sound. Additional biological samples collected are summarized in Table 4.

Pacific hake ranged in size from 10-72 cm with modes at 21 and 32 cm (Appendix table 4). Length frequency analyses by inlet indicated that Barkley Sound and Sydney Inlet contained a greater size range and more size classes of hake than present in Nootka Sound (Fig. 10). Fish larger than 50 cm amounted to less than 1% of the total catch for each inlet. Modal lengths of hake in Barkley Sound were 23, 28 and 32 cm; and 20, 32 and 35 cm in Sydney Inlet. Nootka Sound contained predominately smaller fish with a modal length at 19 cm. The abundance of age 1+ fish (from length frequency analysis) in Barkley Sound (47.4%) was less than in Sydney Inlet (63.7%), and in Nootka Sound (100%). Since the modal length of age 1+ hake increased 3-4 cm from samples taken in Nootka to Barkley Sound it appears each inlet contains a "resident" stock of hake which may have different spawning times assuming similar growth rates. It is of interest that previous reports (McCarter et al. 1982; Cass et al. 1983) present length frequencies from Sydney Inlet which are similar to those collected in this survey.

Female hake accounted for 56% of the total catch (nos.) and dominated all sets made in the coastal inlets. The percent of female hake in the total catch from each inlet was similar: 56% in Barkley Sound and Sydney Inlet, and 53% in Nootka Sound. A total of 327 males and 490 females were examined for gonad condition (Weir et al. 1978; McFarlane et al. 1982) (Table 5). The majority of males (88%) and females (84.8%) were immature, a result of the high abundance of juvenile fish in the catches. Mature hake were found only in Barkley Sound (11.8%) and Sydney Inlet (7.0%), mostly in an early maturing stage (R_1). Few hake examined were in a resting stage, 7.3% in Barkley Sound and in 6.3% Sydney Inlet. The length at 50% maturity for male and female hake in the coastal inlets was 38.5 cm and 40.1 cm, respectively (Fig. 11).

Stomach contents were examined from a total of 239 hake of which 62% were empty or everted (Table 6). The dominant food items (by volume) identified were euphausiids (Euphausiacea) (51%) and eulachons (Thaleichthys pacificus) (25%) in Barkley Sound; Pacific herring (94%) in Sydney Inlet; and smelts (Osmeridae) (78%) in Nootka Sound. The mean stomach contents by volume (excluding everted stomachs) for hake was 3.00 cc in Barkley Sound; 0.92 cc in Sydney Inlet; and 5.10 cc in Nootka Sound.

West Coast Vancouver Island

A total of 6356 hake (23 sets) was sampled from Canadian waters (Fig. 1). A summary of the biological samples collected is presented in Table 7.

Pacific hake ranged in size from 34-74 cm (Appendix table 5). Male hake ranged from 36-63 cm with modal lengths at 41 and 48 cm (Fig. 12). Female hake ranged from 34-74 cm with modal lengths at 42 and 48 cm. The abundance of male hake (72.4%) composing the larger mode (48 cm) was similar to that of female hake (75.3%). Only 0.2% male hake $\geq$60 cm were sampled during the survey, compared to 6.0% females. Bimodality was also evident in the length frequency samples by area (Table 8). The first mode at 41 cm was similar for each area. However, in area 5-1A the second mode at 49 cm was 2-3 cm larger than for the other areas (Fig. 13). It appears that at the time of the survey hake were segregating by size with the larger hake found in area 5-1A. Evidence of this can be seen in the length frequencies collected during the 1983 commercial fishery from each area (Fig. 13). Comparison of the commercial length frequencies by area indicated that the larger mode at 50 cm from area 5-1A, was from an "inshore" area approximately 12 M off Barkley Sound.

The age composition, determined from a total of 892 fish from sets 4, 30 and 35, ranged from 2-18 yr (Table 9). Dominant age-groups in the age frequency histogram (Fig. 14) are 3, 6, 10 and 13 yr (1980, 1977 1973 and 1970 year-classes, respectively). Three and 6-yr-old fish accounted for 22 and 50% of all fish sampled, and 10 and 13-yr-old fish accounted for a further 14%. Strong year-classes are a dominant feature of the offshore hake stock with the strong 1970 and 1973 year-classes being well documented by past workers (Dark et al. 1980; Beamish 1981b; Beamish and McFarlane 1983).

Growth is relatively rapid to age 3 after which it is reduced (Fig. 14). Growth curves for males and females were fitted using the following von Bertalanffy parameters:

	t_o	k	L_∞(cm)
Males	-2.30	0.30	51.4
Females	-2.63	0.25	55.4

The curves are similar for males and females up to age 3 when they begin to diverge with females growing faster than males. The mean lengths of age 3+ (41.7 cm) and age 6+ (48.2 cm) hake is similar to the modal lengths present in the size composition.

Female hake accounted for 52% of the total catch (nos.) and dominated 53% of all sets completed during the survey in Canadian waters. During the survey the sex ratio was approximately 1:1 with female hake more abundant in the 73-109 m (40-60 fath) midwater depth range (Table 10). A total of 1009 males and 1009 females were examined for maturity states of which 2% of the males and 9% of the females were immature (Table 11). The majority of males (56%) and females (47%) were in an early developmental stage (R_1, R_2) and the remainder were in a resting stage (R_t). The length at 50% maturity for males (36.5 cm) and for females (41.9 cm) (Fig. 11) corresponds to age 3+.

Individual round weights were recorded from a total of 855 hake, of which 408 were from the coastal inlets. A length-weight relationship was calculated for males, females, and sexes combined (Fig. 15). The results of the equations are summarized below:

1)	Male	$Wt(gm) = 0.0148\ (FL(cm))^{2.7774}$
2)	Female	$Wt(gm) = 0.0072\ (FL(cm))^{2.9704}$
3)	Male + Female	$Wt(gm) = 0.0082\ (FL(cm))^{2.9351}$

Stomach contents were examined from a total of 811 hake of which 32% had empty or everted stomachs (Table 12). The dominant food items (by volume) were Pacific herring (59.0%) and euphausiids (36.7%). It is of interest to note that one partially digested salmon was identified in one hake stomach from set 2.

West Coast Washington State

A total of 4464 hake were sampled in 11 of 12 sets completed in the U.S. waters (Table 7).

Pacific hake ranged in size from 20-75 cm (Appendix table 5). Male hake ranged from 32-65 cm with modal lengths at 40 and 46 cm (Fig. 12). Female hake ranged from 20-75 cm with modal lengths at 40 and 49 cm. The size range of hake in U.S. waters is similar to that observed in Canadian waters however, modal lengths are 1-2 cm smaller for both male and female hake sampled in U.S. waters (Table 8). The percentage of hake in each modal group was 53.8 and 32.8%, respectively. This is considerably different from the percentage in each mode from hake sampled in Canadian waters, 18.8 and 70.5%, respectively. The abundance of male hake $\geq$60 cm (0.4%) was less than females (7.3%); similar to hake sampled in Canadian waters.

The age composition, determined from a total of 566 fish from sets 15 and 20, ranged from 3-16 yr (Table 13). Age 3+ and 6+ fish (1980 and 1977 year-class) were dominant in the age frequency histogram (Fig. 14). These age groups accounted for 75 and 15% of the catch, respectively which is compared to 22 and 50% for the same year classes off the west coast of Canada.

Growth curves (Fig. 14) for male and female hake in U.S. waters were fitted using the following von Bertalanffy parameters:

	t_o	K	L_∞
Males	-4.31	0.17	55.2
Females	-2.85	0.19	58.7

As can be seen, hake of the same year-class are smaller in U.S. waters than in Canadian waters. This phenomenon has been reported previously (Beamish 1981b; Beamish and McFarlane 1983).

Female hake accounted for 53% of the total catch (nos.) and dominated 58% of all sets completed during the survey. Female hake appeared to be more abundant at depths ranging from 110-182 m (60-100 fath) (Table 10). However, more tows at each depth interval are required to determine the extent of sex segregation with depth.

A total of 954 male and 1134 female hake was examined for maturity state. Twelve percent of the males and 41% of the females were immature (Table 11). This is a reflection of the abundance of smaller, younger hake present in the catches in the U.S. zone. The majority of the mature males (58%) and females (28%) were in an early developmental stage (R_1, R_2) or resting stage (R_t) (30 and 31%, respectively).

Stomach contents were examined from a total of 450 hake of which 50% had empty or everted stomachs (Table 14). Pacific herring was the principal fish species (56.5% by volume) identified in the diet. Euphausiids were the principal invertebrate food item (39.1% by volume). The mean volume of the stomach contents (excluding fish with everted stomachs) was 3.14 cc compared with 7.67 cc for fish sampled in Canadian waters. It is of interest to note that the percentage (volume) of herring and euphausiids found in hake stomachs sampled from U.S. waters is similar to that found in Canadian waters.

WALLEYE POLLOCK

Coastal Inlets along Vancouver Island

A total 338 walleye pollock was sampled in 7 of 11 sets from the three inlets: Barkley Sound, Sydney Inlet, and Nootka Sound. A summary of biological samples collected is presented in Table 15.

Walleye pollock ranged in size from 8-43 cm with modal lengths at 12 and 24 cm (Appendix table 6). The majority of fish sampled were less than 30 cm and no fish was measured larger than 50 cm. The size range of pollock was similar for all 3 inlets (Fig. 16). The majority of the pollock were found in Barkley Sound. The Barkley Sound pollock exhibited 3 modal lengths, 12, 23 and 31-32 cm. From length frequency analysis those modes correspond to age 0+, 1+ and 2+, respectively. Very few pollock were caught in either Sydney Inlet or Nootka Sound. The modal sizes of pollock in Nootka Sound were 8, 10 and 22 cm; and 25 cm in Sydney Inlet.

Male pollock accounted for 54% of the total catch (56% in Barkley Sound and Sydney Inlet; and 41% in Nootka Sound) and dominated 57% of all sets.

West Coast Vancouver Island and Washington State

Walleye pollock were present in 7 of 40 sets completed during the entire survey in the offshore waters. A total of 389 pollock was sampled, 269 fish (6 sets) from Canadian waters and 120 fish (1 set) from U.S. waters. A summary of the biological samples collected is presented in Table 16.

Pollock ranged in length from 25-54 cm (Appendix table 7). Males ranged from 25-51 cm with modal lengths at 37 and 41 cm, and females ranged from 27-54 cm with modal lengths at 36, 45 and 49 cm (Fig. 17). The abundance of males $\geq$50 cm (0.8%) was less than for females (9.7%). The size distribution during this survey was similar to the 1980 and 1981 surveys (Barner et al. 1982a,b). Females accounted for 56% of the total catch and dominated 71% of all sets completed during the survey. Pollock were captured from only one set (set 25) made in U.S. waters. The modal length of pollock in this set was 36 cm with very few fish (1%) $\geq$50 cm.

Pollock ages were estimated from 97 fish from one set (set 33) in Canadian waters, and from 112 fish from one set (set 25) in U.S. waters. In the past age estimation has been difficult because of problems in identifying the first annulus (Beamish 1979). To examine this problem a large sample of varying size lengths of 0+ and 1+ yr-old pollock were collected and the first annulus was identified and its diameter measured (μm). The clarity of the fin-ray sections made it possible to easily identify subsequent annuli in older aged fish. The age composition for pollock in Canadian waters ranged from 1-8 yr (Table 17), and from 2-5 yr in U.S. waters (Table 18). The dominant age group was 3 yr (1980 year-class) accounting for 50.5% of the pollock sampled in Canadian waters and 75.0% in U.S. waters (Fig. 18). A sample of pollock collected in 1976 was also dominated by age 3+ fish (1973 year-class) (Beamish et al. 1982). In both samples the older fish were females.

Growth in length is rapid up to age 3+ after which length becomes reduced (Fig. 18). Growth curves for male and female pollock in Canadian waters were fitted using the following von Bertalanffy parameters:

	t_o	k	L_∞
Male	-0.97	0.32	50.4
Female	-0.96	0.30	56.4

Growth by sex diverges at age 2+ with females growing consistently longer at age than males.

Total instantaneous mortality rates (Z) were estimated by calculating the slope of the right-hand limb using simple linear regression (Ricker 1975). The choice of the first age at full recruitment was 3+ yr and the estimate for males (Z=0.78) and females (Z=0.71) represent the mortality

rate only for ages 3 to 7 and 3 to 8 for males and females respectively. These mortality rates correspond to an annual mortality rate (A) of 0.54 and 0.51 for males and females, respectively, assuming fishing mortality is negligable.

A total of 146 males and 185 females were examined for maturity state (Table 19). The majority (60%) were immature and only 2 males examined were in an early maturation stage (R_1). The sample of pollock from U.S. waters contained mostly immature fish. The length at 50% maturity for male and female pollock in the offshore waters was 38.9 and 41.2 cm, respectively (Fig. 19).

OTHER SPECIES

A summary of other species sampled is presented in Table 20. A total of 98 spiny dogfish, ranging from 30-111 cm, was sampled from one set (no. 7) in Sydney Inlet (Appendix table 8). The majority of the dogfish (96%) were adults >60 cm with a modal length at 99 cm. Females dominated (96%) the set.

A total of 185 bocaccio rockfish was sampled from one set (no. 7) also from Sydney Inlet (Appendix table 9). They ranged in length from 39-71 cm with modes at 50 and 61 cm. Males dominated (66%) the set.

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Table 1. Total catch by vessel and by species ranked in order of abundance during both inshore and offshore surveys (Scientific names in Appendix table 3).

Species	Weight (kg)	Percent
	R/V G.B. REED (inshore)	
Pacific hake	1063	27.7
Ratfish	817	21.3
Spiny dogfish	597	15.5
Flathead sole	115	3.0
Plainfin midshipman	108	2.8
Lingcod	90	2.3
English sole	90	2.3
Skate (spp.)	90	2.3
Pink shrimp	89	2.3
Walleye pollock	53	1.4
Slender sole	50	1.3
Eulachon	48	1.3
Trace[a]	633	16.5
Total	3843	
	F/V MARWOOD (offshore)	
Pacific hake	46507	83.9
Spiny dogfish	6285	11.3
Yellowtail rockfish	1276	2.3
Walleye pollock	736	1.3
Trace[a]	656	1.2
Total	55460	

[a]Trace = All species <1% of the total catch.

Table 2. CPUE estimates[a] for Pacific hake by subjective density estimate, by midwater tow and by gear type in Canadian and U.S. waters. F/V MARWOOD, August 25-September 5, 1983. Catch rates (kg/h) weighted by vessel speed at 3.0 kt (5.6 km/h).

Area	Density estimate	Set no.	Gear type	% in catch	Catch (kg)	CPUE (kg/h)	Mean CPUE (kg/h)
Vancouver Island	L	1	D5	0	0	0	
		3	"	84.7	61	96	535
		31	"	89.4	185	372	
		32	"	99.6	558	1674	
	M	4	D5	98.9	1417	2654	
		6	"	98.6	922	3951	2607
		13	"	25.0	1000	2151	
		27	"	20.0	500	1667	
		38	D8	97.3	651	2170	2170
	H	2	D5	98.4	424	578	
		5	"	94.5	1049	1967	
		7	"	95.6	953	2850	
		8	"	97.5	1306	3265	
		10	"	99.3	1220	4575	3926
		29	"	99.1	328	574	
		30	"	94.9	913	1433	
		33	"	94.7	1107	2992	
		35	"	99.9	3655	18275	
		36	"	99.9	1017	2774	
		37	D8	96.6	6363	47722	
		39	"	99.9	6818	51135	43180
		40	"	99.8	4091	30683	
Washington	L	17	D5	100.0	1131	2121	
		19	"	93.3	293	977	
		20	"	99.0	1432	1378	
		23	"	0	0	0	853
		24	"	96.8	91	210	
		25	"	64.8	114	285	
		26	"	99.1	466	999	
	M	15	D5	99.9	1863	4299	4299
	H	16	D5	99.8	1063	5315	
		18	"	97.2	1077	2663	6018
		21	"	98.0	908	4540	
		22	"	99.1	2521	12605	
		28	"	67.2	1002	4967	

[a]Sets 9, 11, 12, 14 and 34 were not included.

Table 3. Pacific hake catch rates (kg/h) by 36 m (20 fath) midwater depth interval using D5 midwater gear off the Vancouver Island and the State of Washington coasts, F/V MARWOOD, August 25-September 5, 1983.

Depth[a] Interval (m)	Vancouver Island		Washington (USA)	
	No. of hauls[b]	CPUE (kg/h)	No. of hauls	CPUE (kg/h)
36-72	1	1667	1	4299
	2	40909[c]	-	-
73-109	9	1730	1	5315
	1	2170[c]	-	-
110-145	6	5610	6	3931
	1	47722[c]	-	-
146-182	2	459	4	1260
183-219	-	-	1	2121
Total	22		13	
$\bar{X}$ CPUE		2367 30267[c]		3385

[a] Depth of headrope.
[b] Does not include: 3 sets targetting for Pacific herring.
1 set targetting for rockfish.
1 set in Juan de Fuca Strait.
[c] CPUE estimates using D8 gear.

Table 4. Summary of Pacific hake samples. R/V G.B. REED, August 15-21, 1983.

Set no.	Length			Maturity	Stomach contents	Weight	Otoliths	Remarks
	M	F	T					
2	75	107	182	182	55	-	-	T.C.[a]
3	15	42	57	57	0	-	-	T.C.
4	305	346	656	0	0	272	-	Random
5	20	28	48	48	48	0	-	T.C.
6	19	29	48	48	0	31	-	T.C.
7	215	270	485	220	126	96	-	Random
8	261	343	604	173	0	0	173	Random
10	42	47	89	89	10	9	-	T.C.
11	78	90	168	-	-	-	-	T.C.
Total	1030	1302	2337	817	239	408	173	

[a] T.C. = total catch sampled.

Table 5. Pacific Hake maturity frequency. R/V G.B. REED, August 15-21, 1983. Refer to McFarlane et al. (1982) for a description of maturity codes.

SET NO.	2			3			5			6		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	6	10	16	-	4	4	2	3	5	5	5	10
I2	67	93	160	12	26	38	7	6	13	13	19	32
R1	1	4	5	3	14	17	7	5	12	0	0	0
R2	0	-	0	-	0	0	0	0	0	0	0	0
R	0	-	0	-	0	0	0	0	0	0	0	0
1R	0	-	0	-	0	0	0	0	0	0	0	0
2R	0	-	0	-	0	0	0	0	0	0	0	0
RR	0	-	0	-	0	0	0	0	0	0	0	0
S	0	-	0	-	0	0	0	0	0	0	0	0
Rb	0	-	0	-	0	0	0	0	0	0	0	0
Rc	0	-	0	-	0	0	0	0	0	0	0	0
Rt	1	-	1	-	2	2	4	14	18	1	5	6
TOTAL	75	107	182	15	46	61	20	28	48	19	29	48

Table 5 (cont'd)

SET NO.	7			8			10			TOTAL		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	8	60	68	23	31	54	30	44	74	74	157	231
I2	83	55	138	20	60	80	12	3	15	214	262	476
R1	5	5	10	17	4	21	-	-	-	33	32	65
R2	-	0	0	-	0	0	-	-	-	0	0	0
R	-	0	0	-	0	0	-	-	-	0	0	0
1R	-	0	0	-	0	0	-	-	-	0	0	0
2R	-	0	0	-	0	0	-	-	-	0	0	0
RR	-	0	0	-	0	0	-	-	-	0	0	0
S	-	0	0	-	0	0	-	-	-	0	0	0
Rb	-	0	0	-	0	0	-	-	-	0	0	0
Rc	-	0	0	-	0	0	-	-	-	0	0	0
Rt	-	4	4	-	18	18	-	-	-	6	43	49
TOTAL	96	124	220	60	113	173	42	47	89	327	494	821

Table 6. Pacific hake stomach contents by size group and by coastal inlet. R/V G.B. REED, August 15-21, 1983.

	Barkley Sound	Sydney Inlet	Nootka Sound	Total
No. examined	103	126	10	239
No. empty	15	94	-	109
No. everted	31	8	-	39
No. usable	57	24	10	91

	Vol (cc)/size[a]			Vol (cc)/size[a]		Vol (cc)/size[a]	Total
	1	2	3	1	2	1	Vol (cc)
Herring				7	95		102
Eulachon			55				55
Rex sole			40				40
Pollock		10					10
Smelt spp.						40	40
Fish remains (unid.)				1		5	6
Euphausiids	1	66	44	5	1	6	123

[a]The size category of hake denoted by: 1 = 17-26 cm FL.
2 = 27-40 cm FL.
3 = ≥41 cm FL.

Table 7. Summary of Pacific hake sampled. F/V MARWOOD, August 25-September 5, 1983. Pacific hake from sets 15-28 were sampled in U.S. waters.

Set no.	Length			Maturity	Stomach contents	Weight	Otoliths	Remarks
	M	F	T					
2	97	102	199	199	-	-	-	Random
3	39	41	80	80	80	-	-	T.C.[a]
4	167	125	292	292	-	-	292	Random
5	207	180	387	130	65	-	-	"
6	206	246	452	-	-	-	-	"
7	199	196	395	-	-	-	-	"
8	200	212	412	-	-	253	-	"
10	186	190	376	128	128	31	-	"
15	274	347	621	313	99	-	313	"
16	256	250	506	175	-	-	-	"
17	184	208	392	199	93	-	-	"
18	238	215	453	264	-	-	264	"
19	139	157	296	88	88	-	-	"
20	192	205	397	253	-	-	253	"
21	157	206	363	120	57	-	-	"
22	102	284	387	327	40	163	275	"
24	77	64	141	73	73	-	-	"
25	76	70	146	-	-	-	-	T.C.
26	110	158	268	-	-	-	-	Random
28	284	210	494	276	-	-	276	"
29	212	206	418	79	79	-	-	"
30	213	180	393	315	-	-	315	"
31	125	114	239	-	-	-	-	T.C.
32	28	237	265	64	64	-	-	Random
33	141	236	377	96	96	-	-	"
35	248	250	498	285	-	-	286	"
36	152	149	301	95	95	-	-	"
37	113	112	225	-	-	-	-	"
38	164	159	323	56	56	-	-	"
39	225	255	480	99	99	-	-	"
40	113	131	244	100	49	-	180	"
Total	5124	5695	10820	4106	1261	447	2454	

[a]T.C.= Total catch sampled

Table 8. Summary of the size distribution and sex ratio of Pacific hake in both Canadian and U.S. waters. F/V MARWOOD, August 25-September 5, 1983.

		Canadian Waters					U.S. Waters
		51-A	51-A[a]	51-B	5-2	Total	Total
Size range (cm)	Res[b]	34-74	34-74	36-59	38-65	34-74	20-75
	Comm[b]		36-75	34-74	39-69		
Modal length (cm)	Res	41-42, 48	49	41, 46	41, 47	41, 48	40, 46
	Comm		50	40, 48	48		
M:F Ratio	Res	0.88:1	0.74:1	1.10:1	1.01:1	0.91:1	0.88:1
	Comm		0.90:1	0.96:1	1.14:1		
n	Res	5081	2244	1050	225	6356	4464
n	Comm		3797	1639	2810		

[a] "Inshore area" off Barkley Sound.

[b] Res = research vessel catch. Comm = commercial vessel catch.

Table 9. Mean length (cm) of Pacific hake by age-class off the west coast of Vancouver Island (sets 4, 30 and 35). F/V MARWOOD, August 25-September 5, 1983.

Age	Male			Female			Total		
(y)	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N
2	-	-	-	34.9	0.00	1	34.9	0.00	1
3	41.5	2.63	83	41.9	2.48	111	41.7	2.55	194
4	45.8	3.32	9	45.1	1.89	5	45.6	2.84	14
5	45.6	2.32	18	47.9	1.84	7	46.3	2.40	25
6	47.5	2.52	248	49.0	2.59	197	48.2	2.65	445
7	48.1	2.21	9	51.0	3.49	9	49.6	3.19	18
8	49.8	2.13	15	53.0	4.81	11	51.1	3.80	26
9	52.2	1.85	10	53.9	3.13	13	53.2	2.74	23
10	50.5	2.51	44	53.3	2.75	34	51.7	2.96	78
11	49.9	3.00	8	52.9	2.86	3	50.7	3.14	11
12	50.8	1.18	3	52.0	0.00	1	51.1	1.13	4
13	51.0	2.99	19	54.4	3.58	28	53.0	3.72	47
14	53.3	2.30	4	-	-	-	53.3	2.30	4
15	48.6	0.00	1	-	-	-	48.6	0.00	1
18	50.4	0.00	1	-	-	-	50.4	0.00	1
Total			472			420			892

Table 10. Percentage of male and female hake by 36 m (20 fath) midwater depth interval off the Vancouver Island and the State of Washington coasts.

Depth[a] interval (m)	Vancouver Island			Washington (USA)		
	No. tows	Percent		No. tows	Percent	
		M	F		M	F
36-72	2	53.6	46.4	1	44.1	55.9
73-109	7	42.9	57.1	1	50.6	49.4
110-145	7	50.8	49.2	6	46.0	54.0
146-182	2	51.3	48.7	3	48.3	51.7
183-219				1	46.9	53.1

[a]Depth of headrope.

Table 11. Pacific hake maturity frequency. F/V MARWOOD, August 25-September 5, 1983.

SET NO.	2			3			4			5		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	-	-	-	-	-	-	-	-	-	-	-	-
I2	5	16	21	-	-	-	-	-	-	1	7	8
R1	47	43	90	18	9	27	106	56	162	47	18	65
R2	0	0	0	0	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0	0	0	0	0
1R	0	0	0	0	0	0	0	0	0	0	0	0
2R	0	0	0	0	0	0	0	0	0	0	0	0
RR	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0	0
Rb	0	1	1	0	0	0	0	0	0	0	0	0
Rc	0	0	0	0	0	0	0	1	1	0	0	0
Rt	45	42	87	21	32	53	61	68	129	32	25	57
TOTAL	97	102	199	39	41	80	167	125	292	80	50	130

Table 11 (cont'd)

SET NO.	10			15			16			17		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	-	-	-	1	2	3	1	-	1	-	-	-
I2	4	3	7	31	138	169	4	54	58	15	74	89
R1	47	13	60	75	16	91	57	21	78	73	13	86
R2	0	0	0	0	0	0	0	0	0	0	0	0
R	2	0	2	0	0	0	0	0	0	0	0	0
1R	0	0	0	0	0	0	0	0	0	0	0	0
2R	0	0	0	0	0	0	0	0	0	0	0	0
RR	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0	0
Rb	0	0	0	0	0	0	0	0	0	0	0	0
Rc	0	0	0	0	0	0	0	0	0	0	0	0
Rt	4	55	59	27	23	50	18	20	38	8	16	24
TOTAL	57	71	128	134	179	313	80	95	175	96	103	199

Table 11 (cont'd)

SET NO.	18			19			20			21		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	1	3	4	-	-	-	-	-	-	-	-	-
I2	22	60	82	7	42	49	13	37	50	2	15	17
R1	89	36	125	24	7	31	87	42	129	27	24	51
R2	0	0	0	0	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0	0	0	0	0
1R	0	0	0	0	0	0	0	0	0	0	0	0
2R	0	0	0	0	0	0	0	0	0	0	0	0
RR	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0	0
Rb	0	0	0	0	0	0	0	0	0	0	0	0
Rc	0	0	0	0	0	0	0	0	0	0	0	0
Rt	29	24	53	6	2	8	31	43	74	23	29	52
TOTAL	141	123	264	37	51	88	131	122	253	52	68	120

Table 11 (cont'd)

SET NO.	22			24			28			29		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	-	-	-	-	-	-	-	3	3	-	1	1
I2	2	-	2	5	11	16	11	23	34	4	15	19
R1	47	117	164	5	4	9	69	40	109	20	13	33
R2	0	0	0	0	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0	0	0	0	0
1R	0	0	0	0	0	0	0	0	0	0	0	0
2R	0	0	0	0	0	0	0	0	0	0	0	0
RR	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0	0
Rb	0	1	1	0	0	0	0	0	0	0	0	0
Rc	1	1	2	0	0	0	0	0	0	0	0	0
Rt	33	125	158	28	20	48	82	48	130	22	4	26
TOTAL	83	244	327	38	35	73	162	114	276	46	33	79

Table 11 (cont'd)

SET NO.	30			32			33			35		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	-	1	1	-	-	-	-	-	-	-	1	1
I2	7	40	47	-	1	1	-	-	-	1	4	5
R1	119	81	200	2	40	42	17	31	48	97	89	186
R2	0	0	0	0	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0	0	0	0	0
1R	0	0	0	0	0	0	0	0	0	0	0	0
2R	0	0	0	0	0	0	0	0	0	0	0	0
RR	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0	0
Rb	0	0	0	0	0	0	0	0	0	0	0	0
Rc	0	0	0	0	0	0	0	0	0	0	0	0
Rt	38	29	67	3	18	21	21	27	48	43	50	93
TOTAL	164	151	315	5	59	64	38	58	96	141	144	285

Table 11 (cont'd)

SET NO.	36			38			39			40		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	-	-	-	-	-	-	-	-	-	-	-	-
I2	1	2	3	-	-	-	-	-	-	-	1	1
R1	33	27	60	-	13	13	10	9	19	-	27	27
R2	0	0	0	-	0	0	0	0	0	-	1	1
R	0	0	0	-	0	0	0	0	0	-	0	0
1R	0	0	0	-	0	0	0	0	0	-	0	0
2R	0	0	0	-	0	0	0	0	0	-	0	0
RR	0	0	0	-	0	0	0	0	0	-	0	0
S	0	0	0	-	0	0	0	0	0	-	0	0
Rb	0	0	0	-	0	0	0	0	0	-	3	3
Rc	0	0	0	-	0	0	0	1	1	4	8	12
Rt	18	14	32	29	14	43	40	39	79	40	16	56
TOTAL	52	43	95	29	27	56	50	49	99	44	56	100

Table 11 (cont'd)

SET NO.	TOTAL			TOTAL CDN WATERS			TOTAL U.S. WATERS		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T
I1	3	11	14	-	3	3	3	8	11
I2	135	543	678	23	89	112	112	454	566
R1	1116	789	1905	563	469	1032	533	320	873
R2	0	1	1	0	1	1	0	0	0
R	2	0	2	2	0	2	0	0	0
1R	0	0	0	0	0	0	0	0	0
2R	0	0	0	0	0	0	0	0	0
RR	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0
Rb	0	5	5	0	4	4	0	1	1
Rc	5	11	16	4	10	14	1	1	2
Rt	702	783	1485	417	433	850	285	350	635
TOTAL	1963	2143	4106	1009	1009	2018	954	1134	2088

Table 12. Pacific hake stomach contents examined from samples collected off west coast Vancouver Island. F/V MARWOOD, August 25-September 5, 1983.

No. examined	811	
No. empty	153	
No. everted	103	
No. usable	555	
Food items	**Volume (cc)**	**(%)**
Herring	3205	59.0
Salmon sp.	100	1.8
Smelt (osmeridae)	65	1.2
Fish remains (unid.)	15	0.3
Euphausiid	1992	36.7
Pink shrimp	39	0.7
Squid	10	0.2
Amphipod	5	0.1
Total volume	5431	

Table 13. Mean length (cm) of Pacific hake by age class off the west coast of Washington State (sets 15 and 20). F/V MARWOOD, August 25-September 5, 1983.

Age	Male			Female			Total		
(y)	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N
3	39.8	2.12	193	40.2	1.92	232	40.0	2.02	425
4	41.7	1.42	4	0	0	0	41.7	1.42	4
5	45.8	2.30	7	48.7	1.75	5	47.0	2.47	12
6	45.9	2.04	48	48.3	2.43	38	46.9	2.50	86
7	46.0	0.00	1	51.6	3.04	2	49.7	3.86	3
8	53.3	3.82	2	51.7	0.42	2	52.5	2.40	4
9	50.3	0.00	1	54.1	1.82	3	53.2	2.42	4
10	48.8	1.87	3	51.1	1.33	3	50.0	1.94	6
11	47.6	0.00	1	57.6	2.44	3	55.1	5.40	4
12	54.0	1.48	2	55.1	0.61	3	54.7	1.02	5
13	53.2	3.76	3	56.6	5.78	6	55.5	5.23	9
14	-	-	-	54.6	5.38	3	54.6	5.38	3
16	-	-	-	63.1	0.00	1	63.1	0.00	1
Total			265			301			566

Table 14. Pacific hake stomach contents examined from samples collected off west coast of Washington State. F/V MARWOOD, August 25-September 5, 1983.

No. examined	450	
No. empty	178	
No. everted	48	
No. usable	224	
Food items	**Volume (cc)**	**(%)**
Herring	713	56.5
Slender sole	40	3.2
Fish remains (unid.)	8	0.6
Myctophid	1	0.1
Euphausiid	494	39.1
Digested matter (unid.)	6	0.5
Total volume	1262	

Table 15. Summary of walleye pollock sampled. R/V G.B. REED, August 15-21, 1983.

Set no.	Length			Maturity	Remarks
	M	F	T		
3	-	4	4	4	T.C.[a]
4	93	68	161		T.C.
5	47	38	85		T.C.
7	19	15	34		T.C.
9	1	2	3		T.C.
10	7	6	13		T.C.
11	14	24	38		T.C.
Total	181	157	338	4	

[a]T.C. = total catch sampled.

Table 16. Summary of walleye pollock sampled. F/V MARWOOD, August 25-September 5, 1983.

Set no.	Length			Maturity	Fins	Remarks
	M	F	T			
5	5	6	11	-	-	T.C.
6	11	11	22	-	-	T.C.
7	27	34	61	61	-	T.C.
8	31	18	49	49	-	T.C.
25	52	68	120	120	120	Random
33	36	65	101	101	101	T.C.
38	10	15	25	-	-	T.C.
Total	172	217	389	331	221	

Table 17. Mean length (cm) of walleye pollock by age class off the west coast of Vancouver Island (set 33). F/V MARWOOD, August 25-September 5, 1983.

Age	Male			Female			Total		
(y)	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N
1	24.8	0.00	1	27.7	0.00	1	26.6	1.63	2
2	0	0	0	37.7	0.61	3	37.7	0.61	3
3	36.5	2.21	18	37.7	2.73	31	37.2	2.59	49
4	40.7	2.34	6	46.6	2.58	11	44.5	3.80	17
5	45.0	3.01	3	48.3	2.49	11	47.6	2.84	14
6	44.3	1.28	5	50.3	2.19	4	47.0	3.52	9
7	47.4	3.39	2	0	0	0	47.4	3.39	2
8	-	-	-	52.9	0.00	1	52.9	0.00	1
Total			35			62			97

Table 18. Mean length (cm) of walleye pollock by age class off west coast of Washington State (set 25). F/V MARWOOD, August 25-September 5, 1983.

Age	Male			Female			Total		
(y)	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N
2	32.8	0.47	5	33.9	1.66	8	33.5	1.42	13
3	36.1	2.11	38	36.6	1.59	46	36.4	1.84	84
4	38.6	3.13	9	39.0	2.38	5	38.7	2.79	14
5	-	-	-	52.7	-	1	52.7	0.00	1
Total			52			60			112

Table 19. Walleye pollock maturity frequency. F/V MARWOOD, August 25-September 5, 1983.

SET NO.	7			8			25			33		
GONAD MATURITY STAGE	M	F	T	M	F	T	M	F	T	M	F	T
I1	-	1	1	5	1	6	34	11	45	9	13	22
I2	7	9	16	2	7	9	10	54	64	11	23	34
R1	1	0	1	0	0	0	1	0	1	0	0	0
R2	0	0	0	0	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0	0	0	0	0
1R	0	0	0	0	0	0	0	0	0	0	0	0
2R	0	0	0	0	0	0	0	0	0	0	0	0
RR	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0	0
Rb	0	0	0	0	0	0	0	0	0	0	1	1
Rc	0	0	0	0	0	0	0	0	0	0	0	0
Rt	19	24	43	24	10	34	7	3	10	16	28	44
TOTAL	27	34	61	31	18	49	52	68	120	36	65	101

Table 19 (cont'd)

SET NO.	TOTAL		
GONAD MATURITY STAGE	M	F	T
I1	48	26	74
I2	30	93	123
R1	2	0	2
R2	0	0	0
R	0	0	0
1R	0	0	0
2R	0	0	0
RR	0	0	0
S	0	0	0
Rb	0	1	1
Rc	0	0	0
Rt	66	65	131
TOTAL	146	185	331

Table 20. Summary of species sampled other than Pacific hake or walleye pollock. R/V G.B. REED, August 15-21, 1983.

Species	Set no.	Length			Remarks
		M	F	T	
Bocaccio rockfish	7	122	64	186	T.C.
Spiny dogfish	7	4	94	98	T.C.

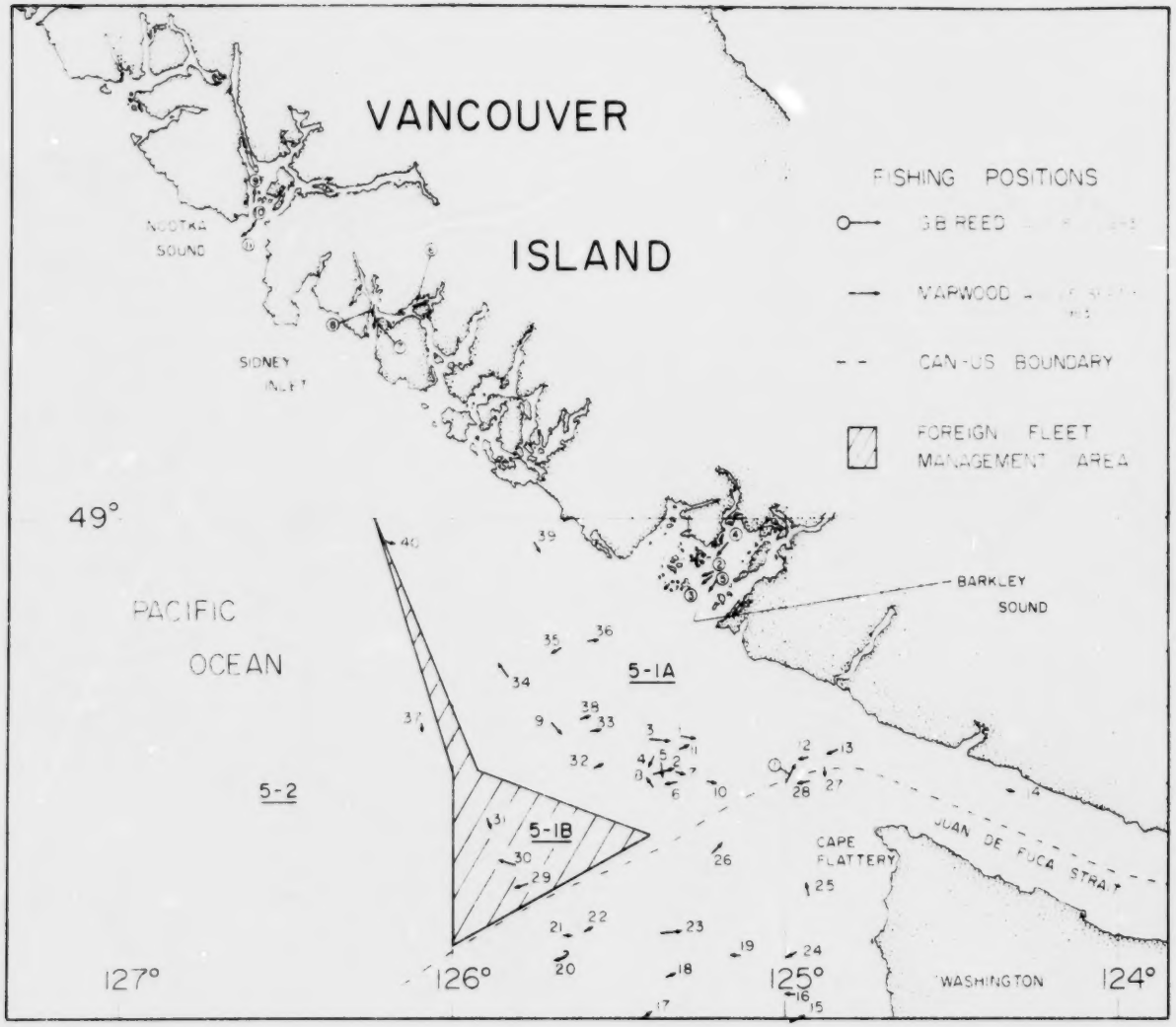


Fig. 1. Set locations by the R/V G.B. REED and the F/V MARWOOD, August 15-September 5, 1983. Management areas 5-1A, 5-1B, and 5-2 for the offshore foreign fleet is included.

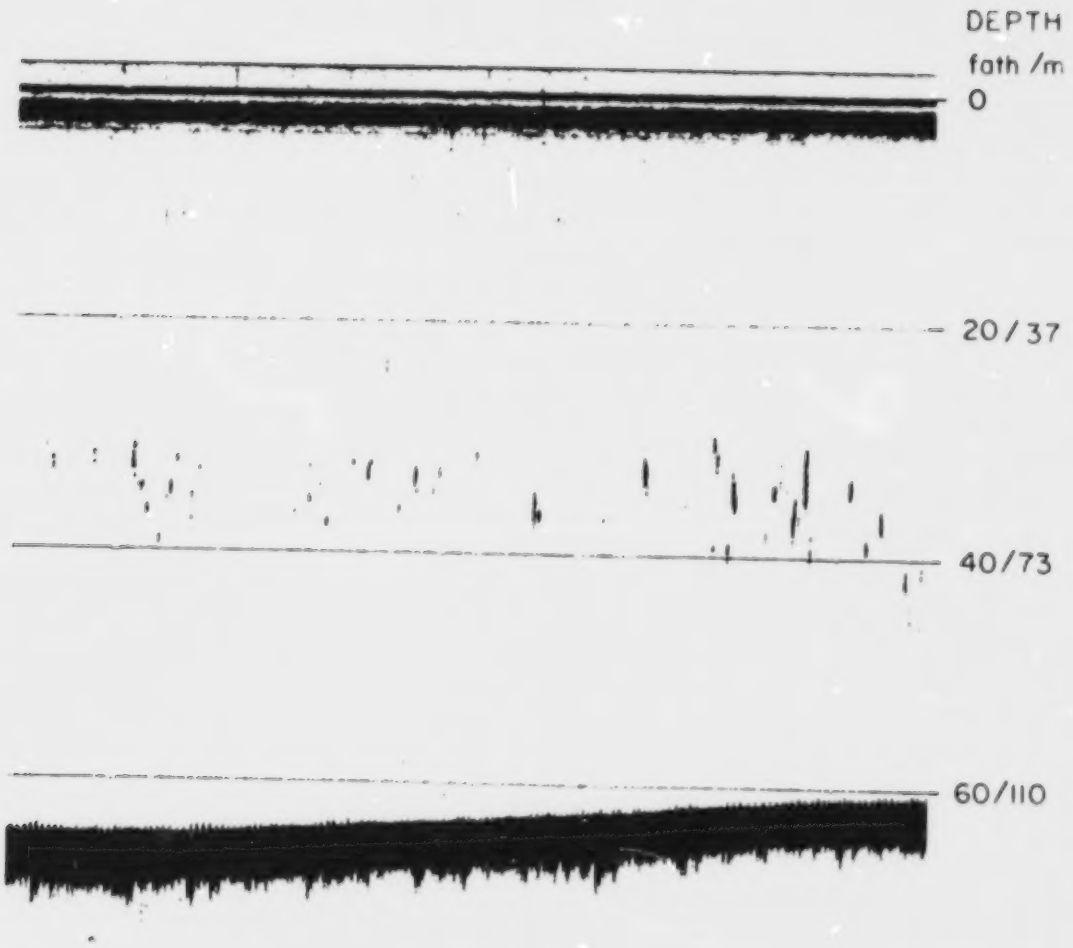


Fig. 2. Echogram recording representing a light (L) midwater concentration off the west coast of Vancouver Island, August-September, 1983.

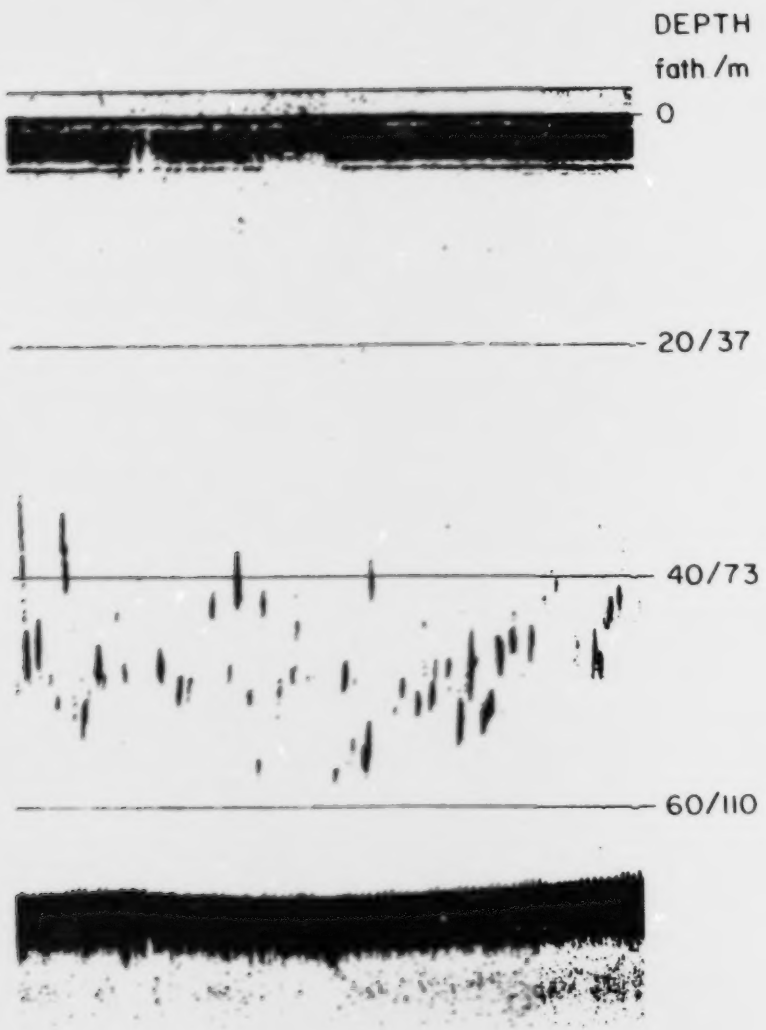


Fig. 3. Echogram recording representing a medium (M) midwater concentration off the west coast of Vancouver Island, August-September, 1983.

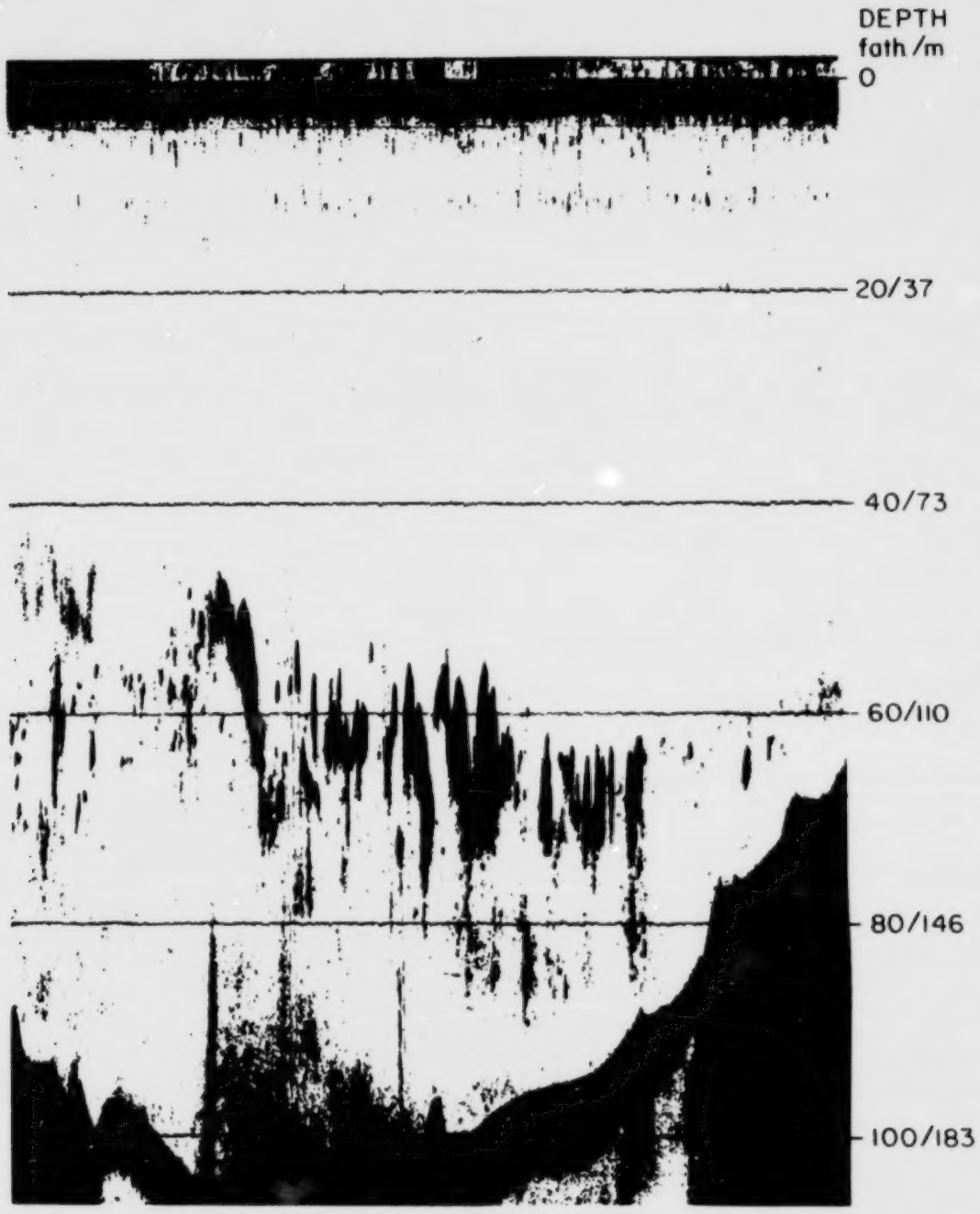


Fig. 4. Echogram recording representing a heavy (H) midwater concentration off the west coast of Vancouver Island, August-September, 1983.

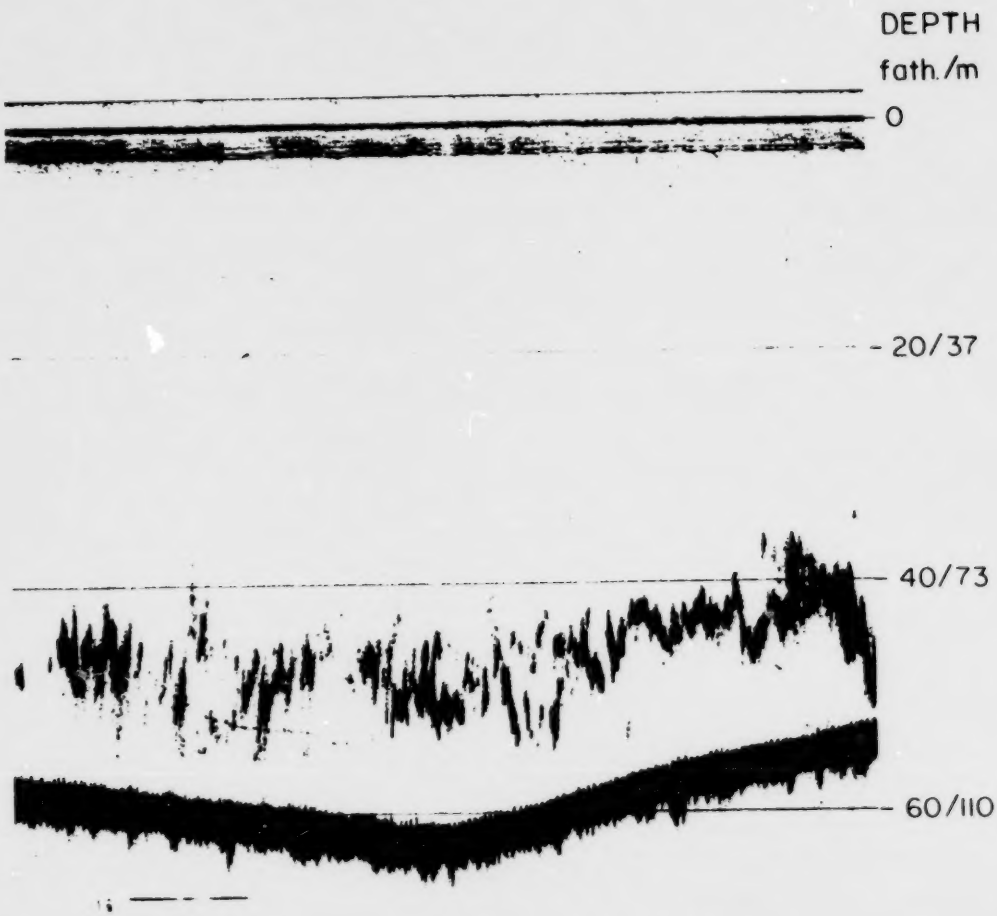


Fig. 5. Echogram recording representing a heavy (H) midwater concentration aggregating to form a "saw-tooth" type configuration.

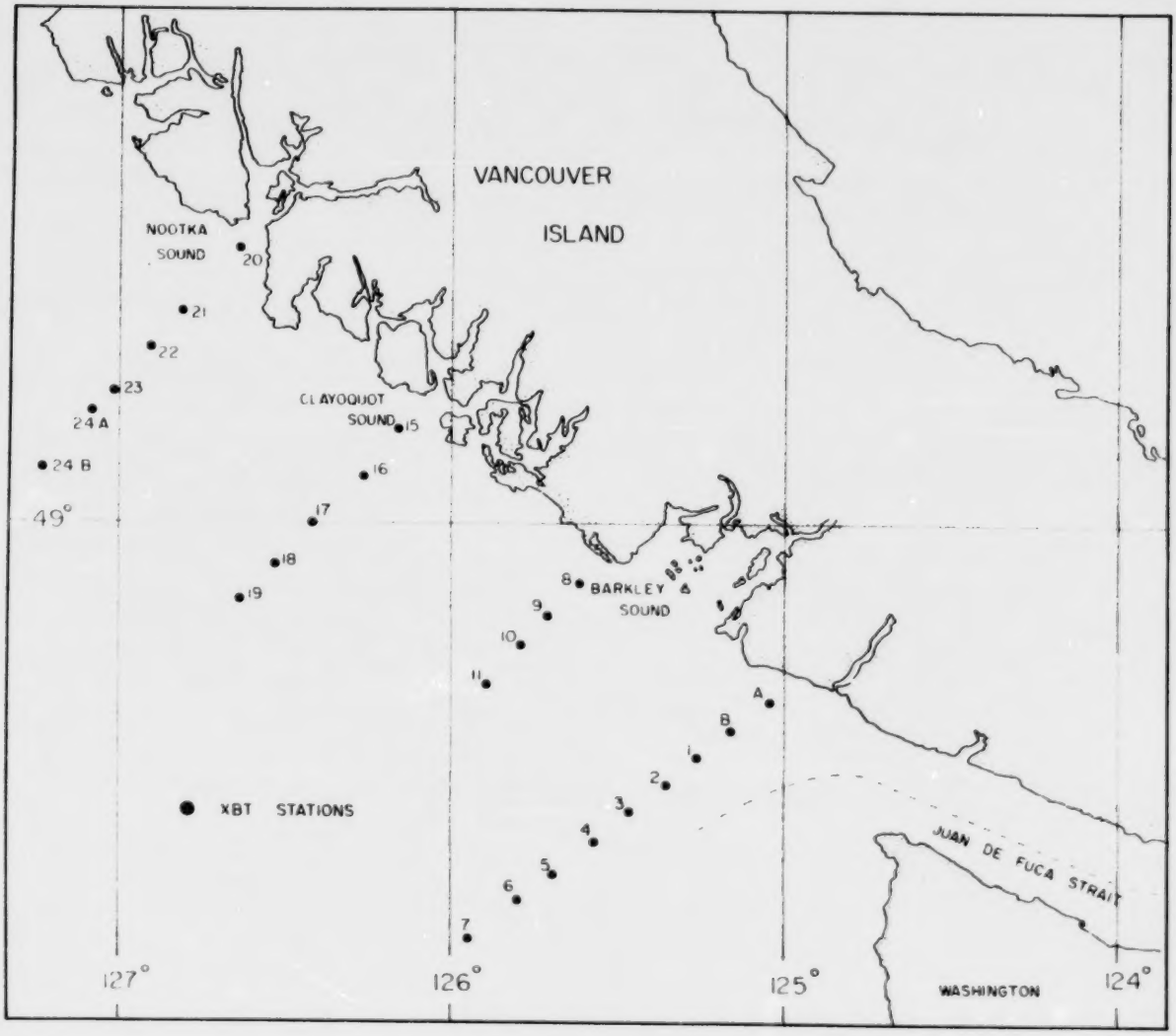


Fig. 6. Expendable bathy-thermograph (XBT) stations completed off the west coast of Vancouver Island by the R/V G.B. REED, August 1983.

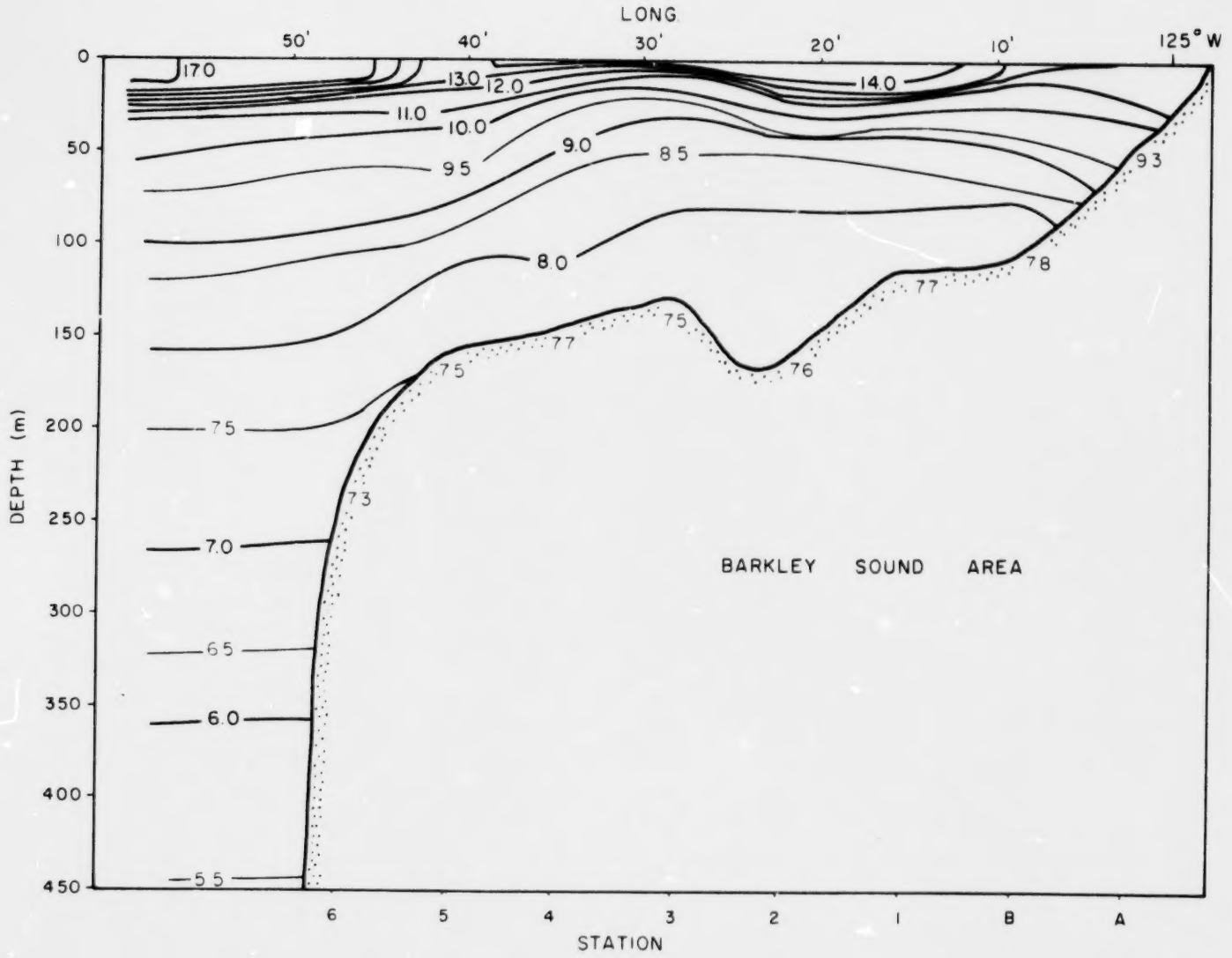


Fig. 7. Temperature profiles from the XBT stations (A-6) recorded off Barkley Sound, August, 1983.

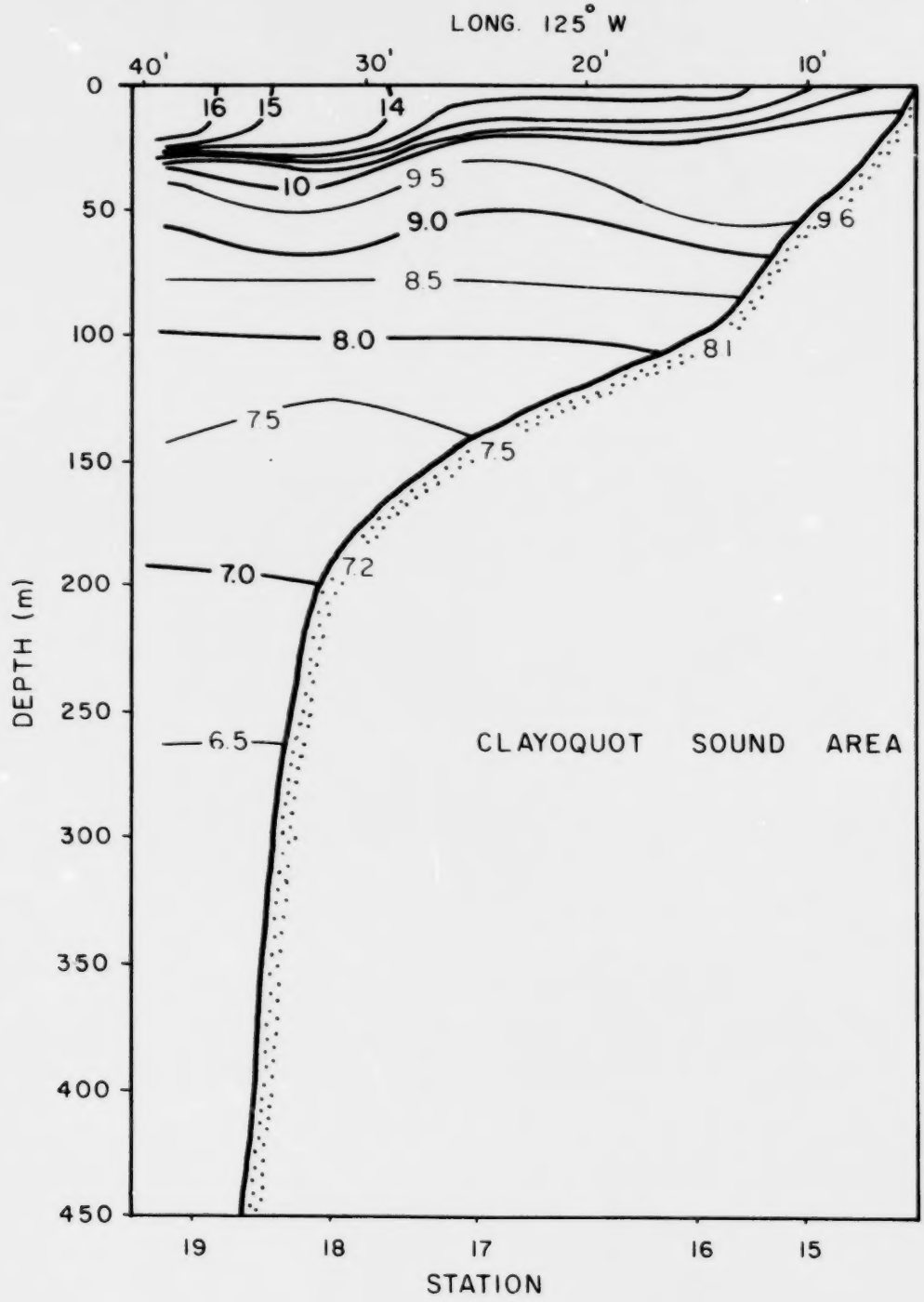


Fig. 8. Temperature profiles from the XBT stations (15-19) recorded off Clayoquot Sound, August 1983.

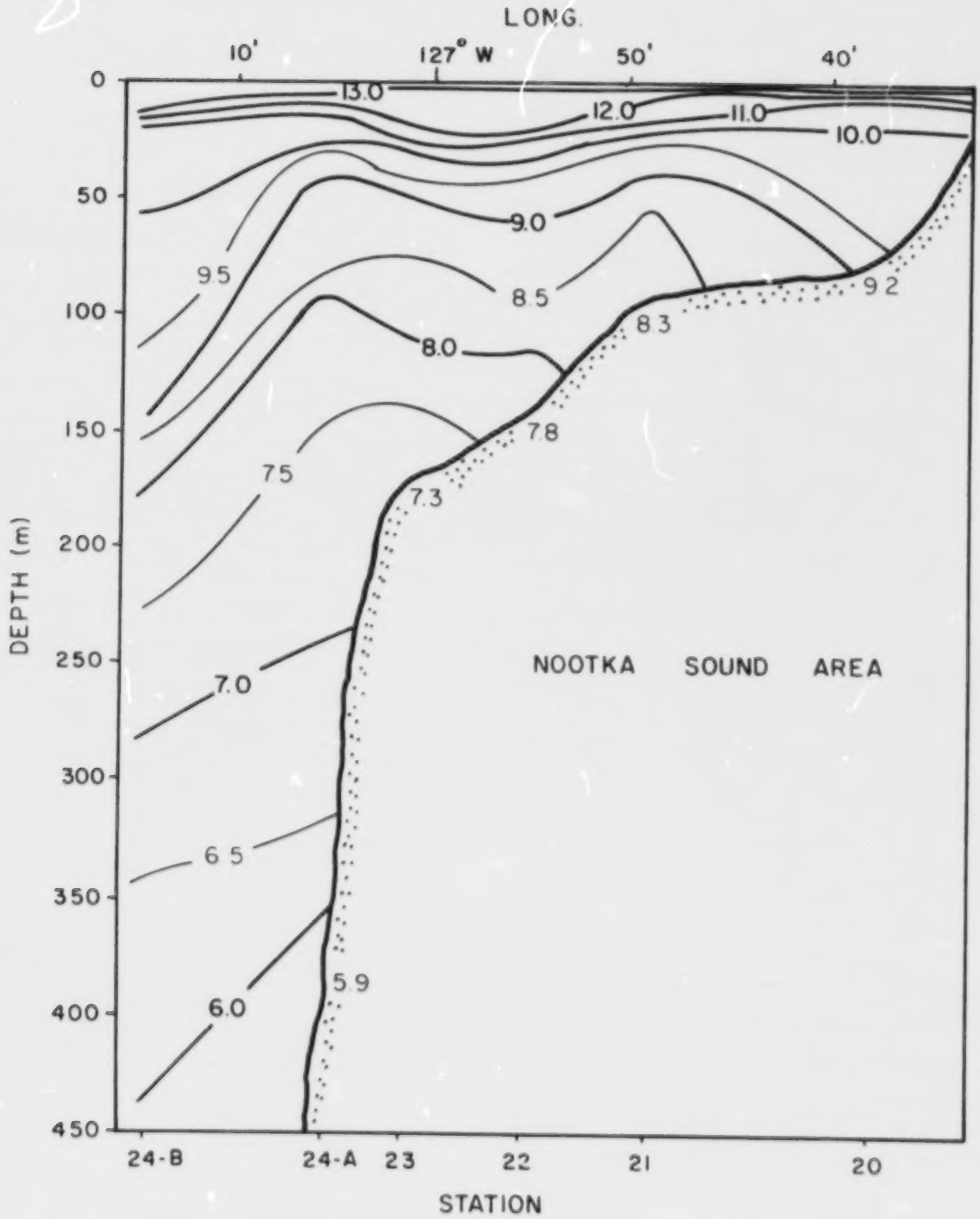


Fig. 9. Temperature profiles from the XBT station (20-24B) recorded off Nootka Sound, August 1983.

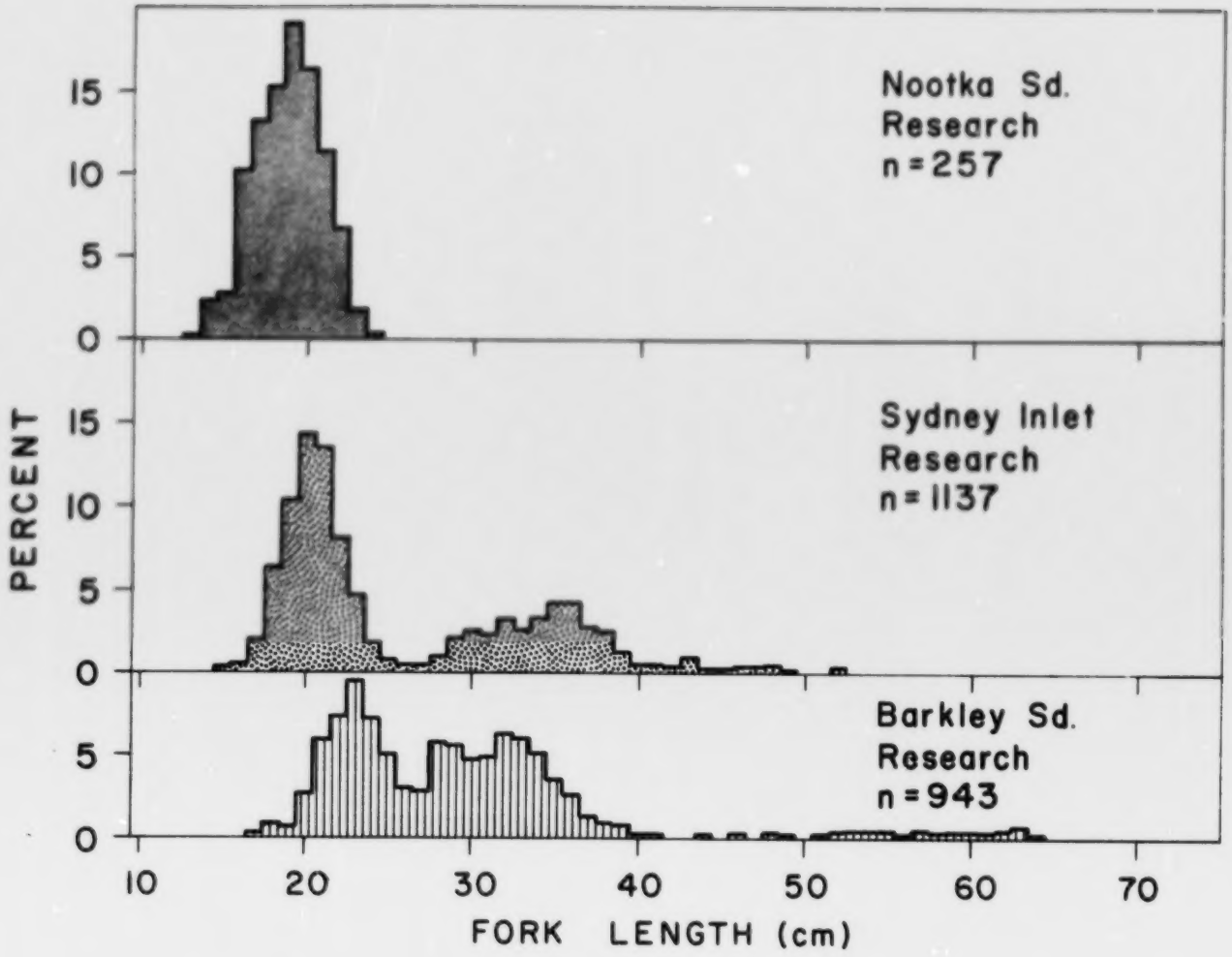


Fig. 10. Pacific hake length frequency by coastal inlet, R/V G.B. REED, August 15-21, 1983.

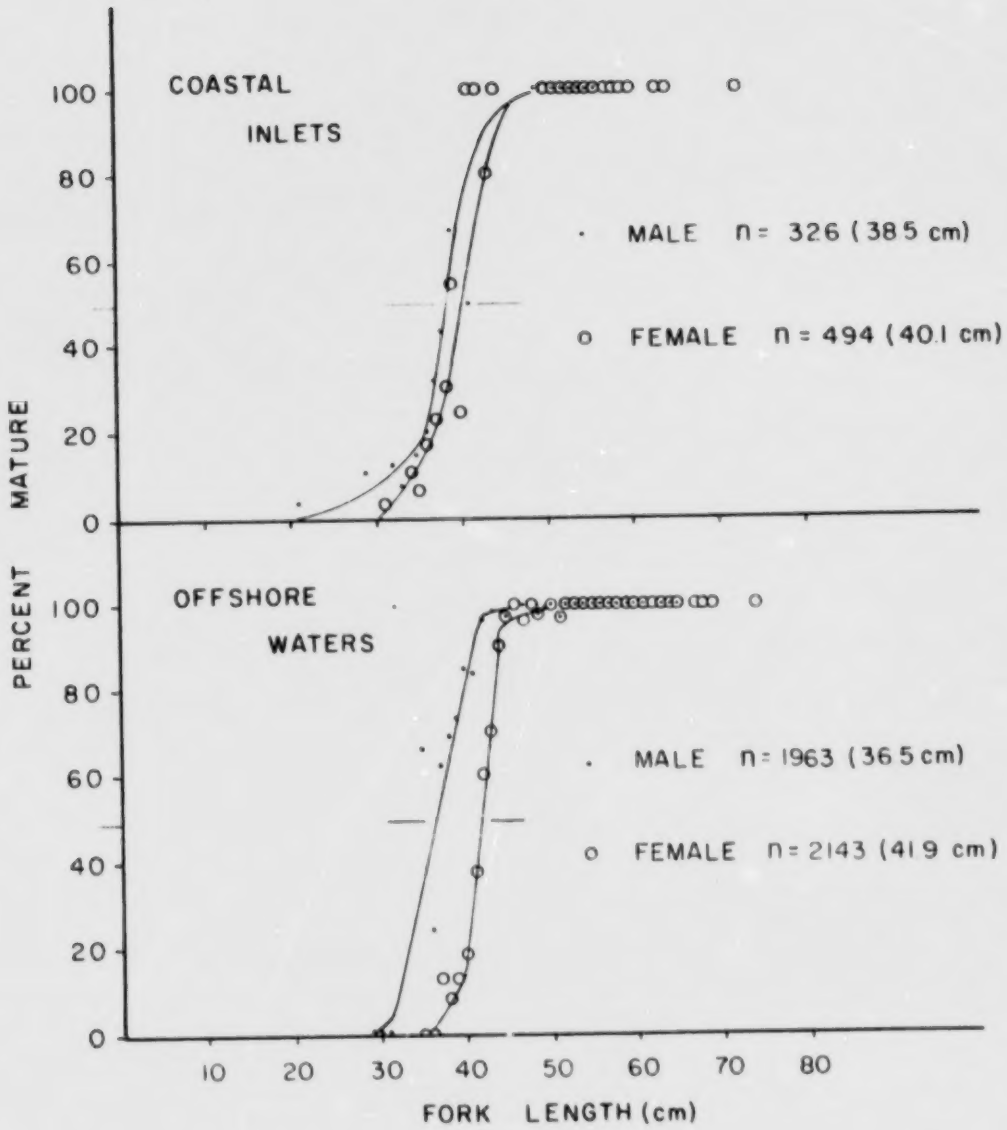


Fig. 11. Maturity ogives (length at 50%) for Pacific hake by sex collected in the coastal inlets and in the offshore waters off Vancouver Island, August 15 - September 5, 1983.

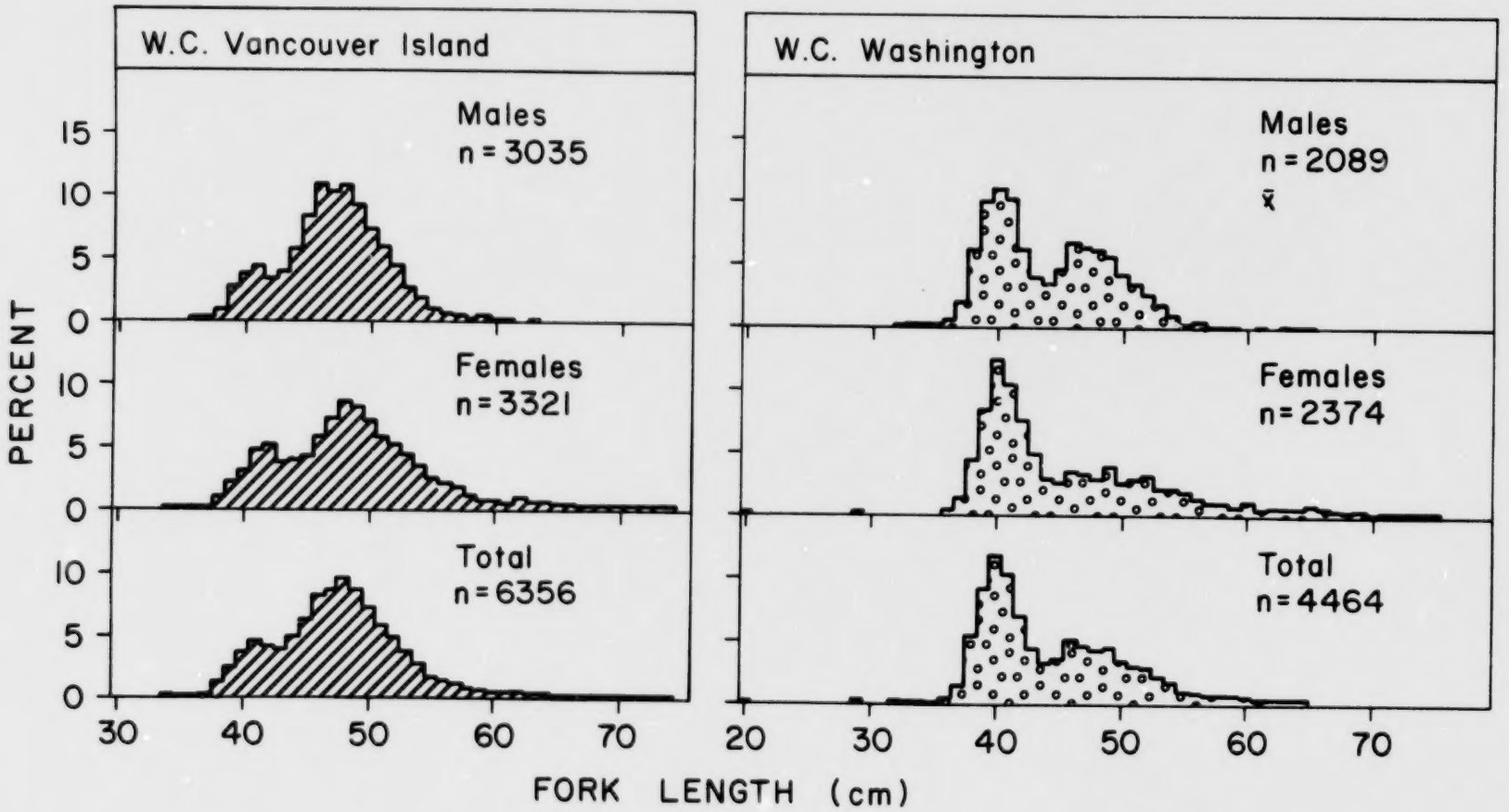
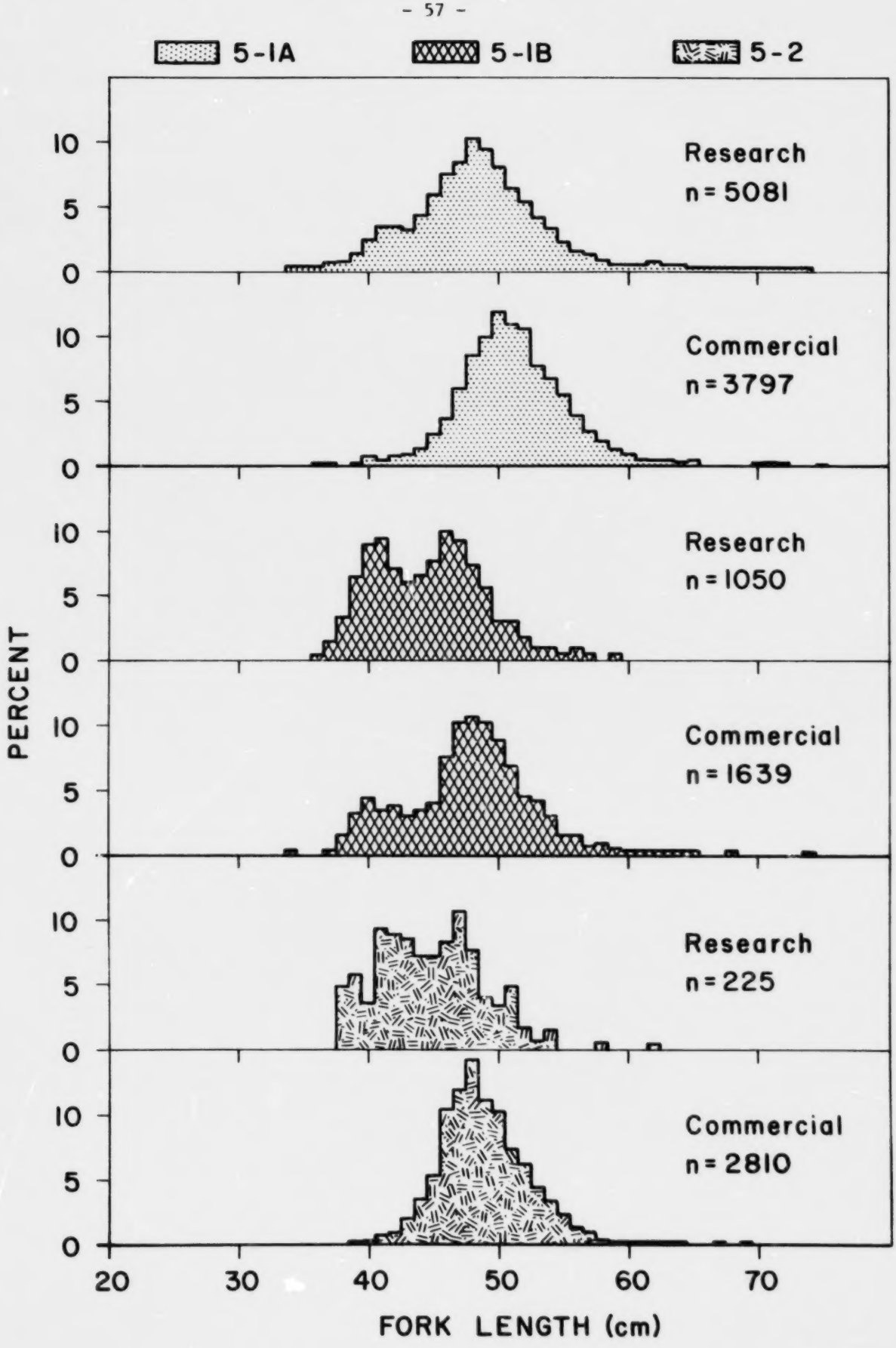


Fig. 12. Length frequency histogram by sex for Pacific hake collected off the west coast of Vancouver Island and the State of Washington, August 15 - September 5, 1983.

Fig. 13. Length frequency of Pacific hake by management areas 5-1A, 5-1B, and 5-2 during the 1983 offshore hake fishery and the research cruise during August 15 - September 5, 1983.


5-1A
5-1B
5-2
Research
n = 5081
Commercial
n = 3797
Research
n = 1050
Commercial
n = 1639
Research
n = 225
Commercial
n = 2810
PERCENT
0
5
10
20
30
40
50
60
70
FORK LENGTH (cm)

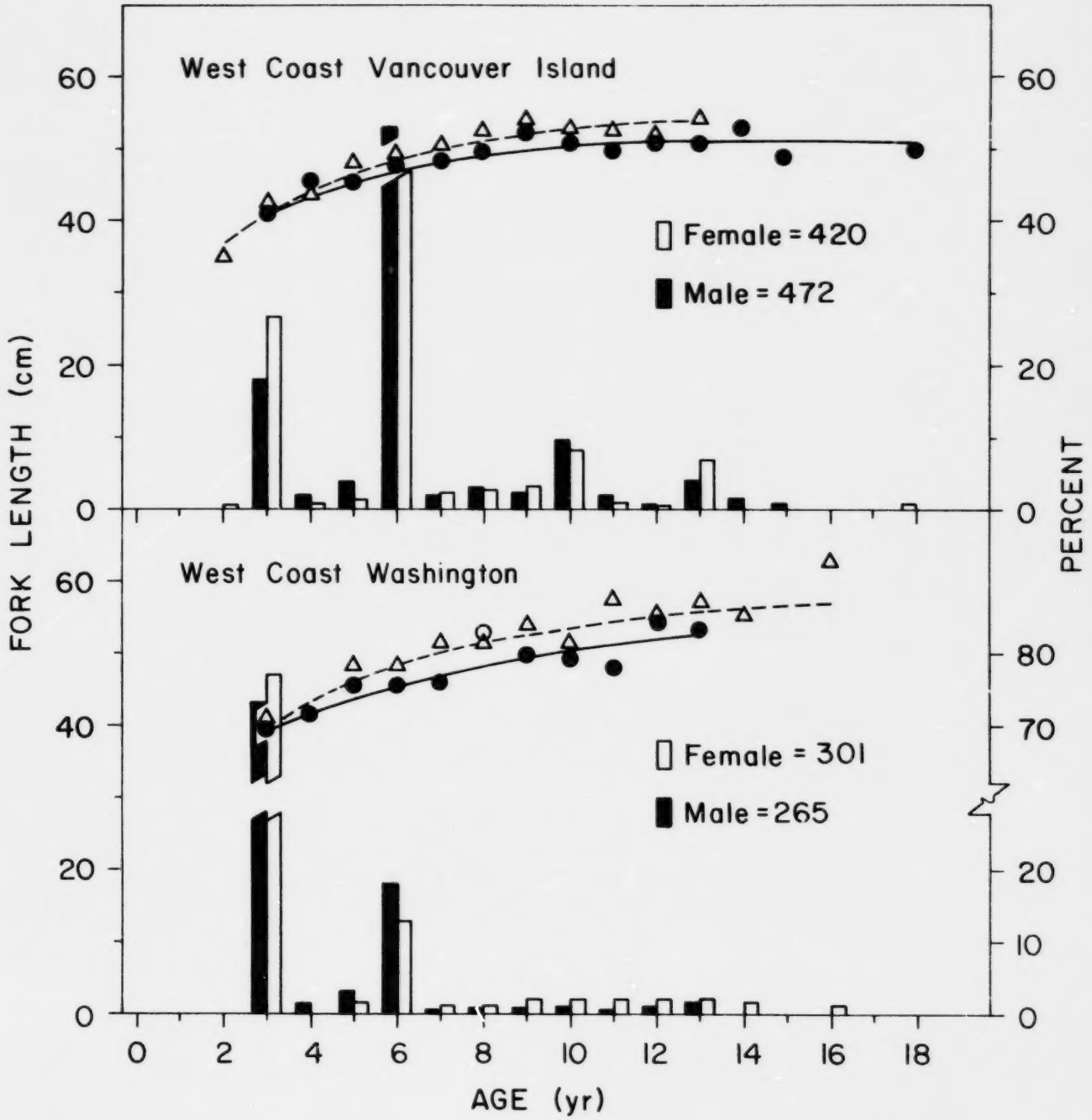


Fig. 14. Pacific hake age frequency and mean length at age plots (curves fitted by von Bertalanffy parameters) by sex for the west coast of Vancouver Island and the State of Washington, August 15 - September 5, 1983.

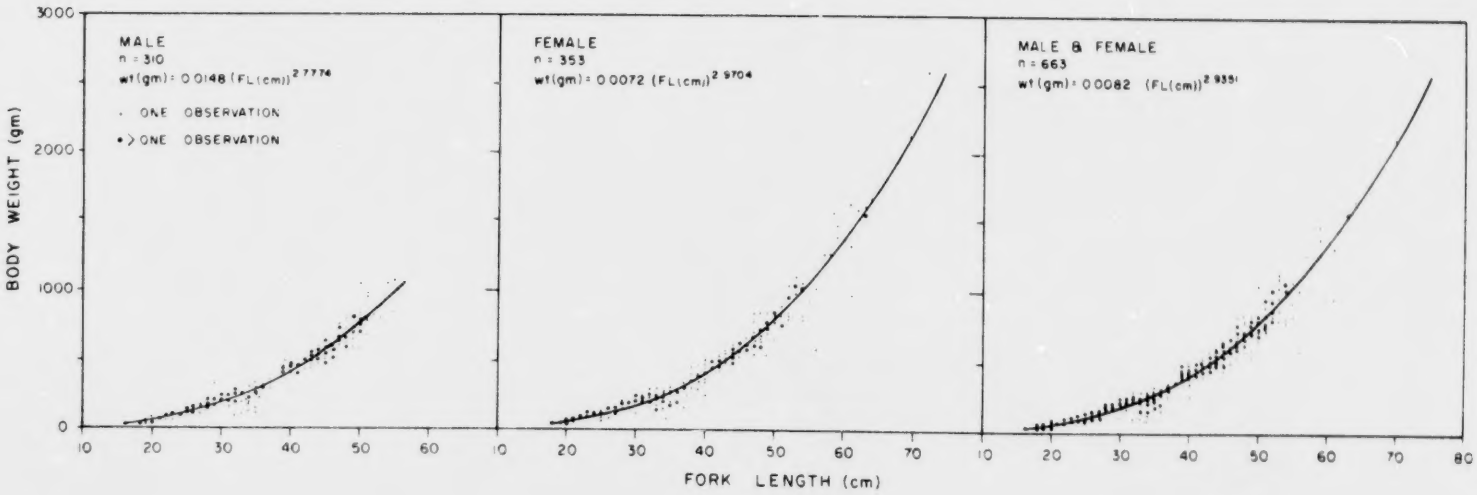


Fig. 15. Length-weight relationship for Pacific hake collected off the west coast of Vancouver Island, August 15 - September 5, 1983.

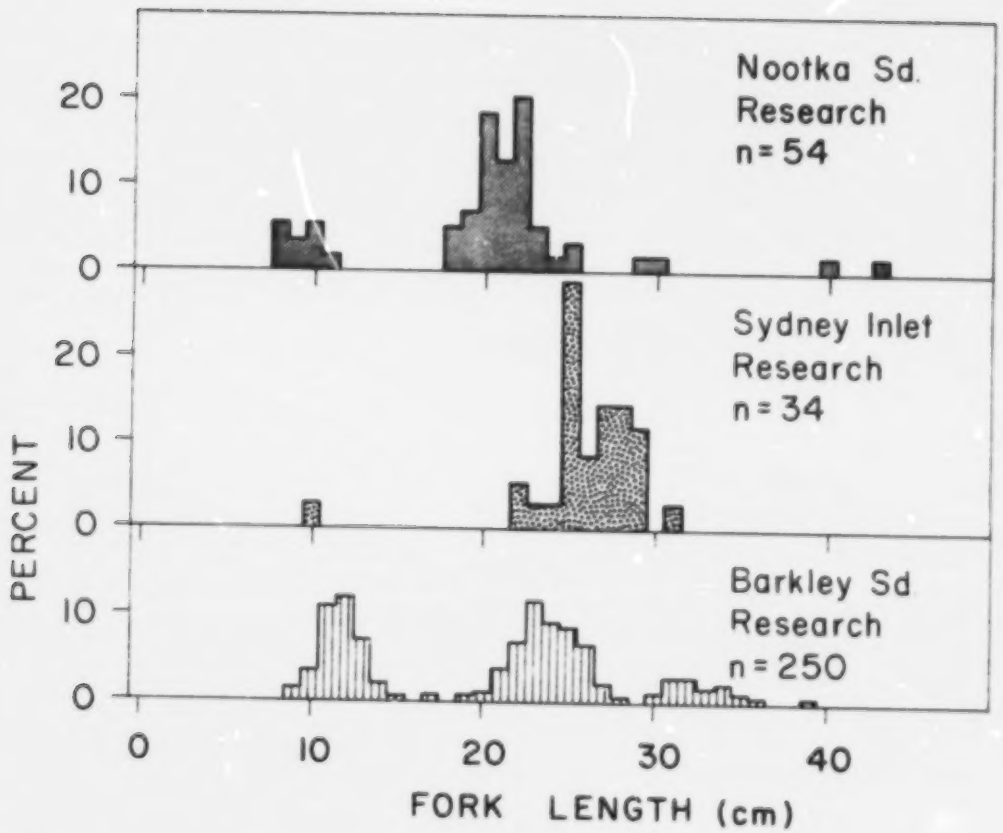


Fig. 16. Walleye pollock length frequency by coastal inlet. R/V G.B. REED, August 15-21, 1983.

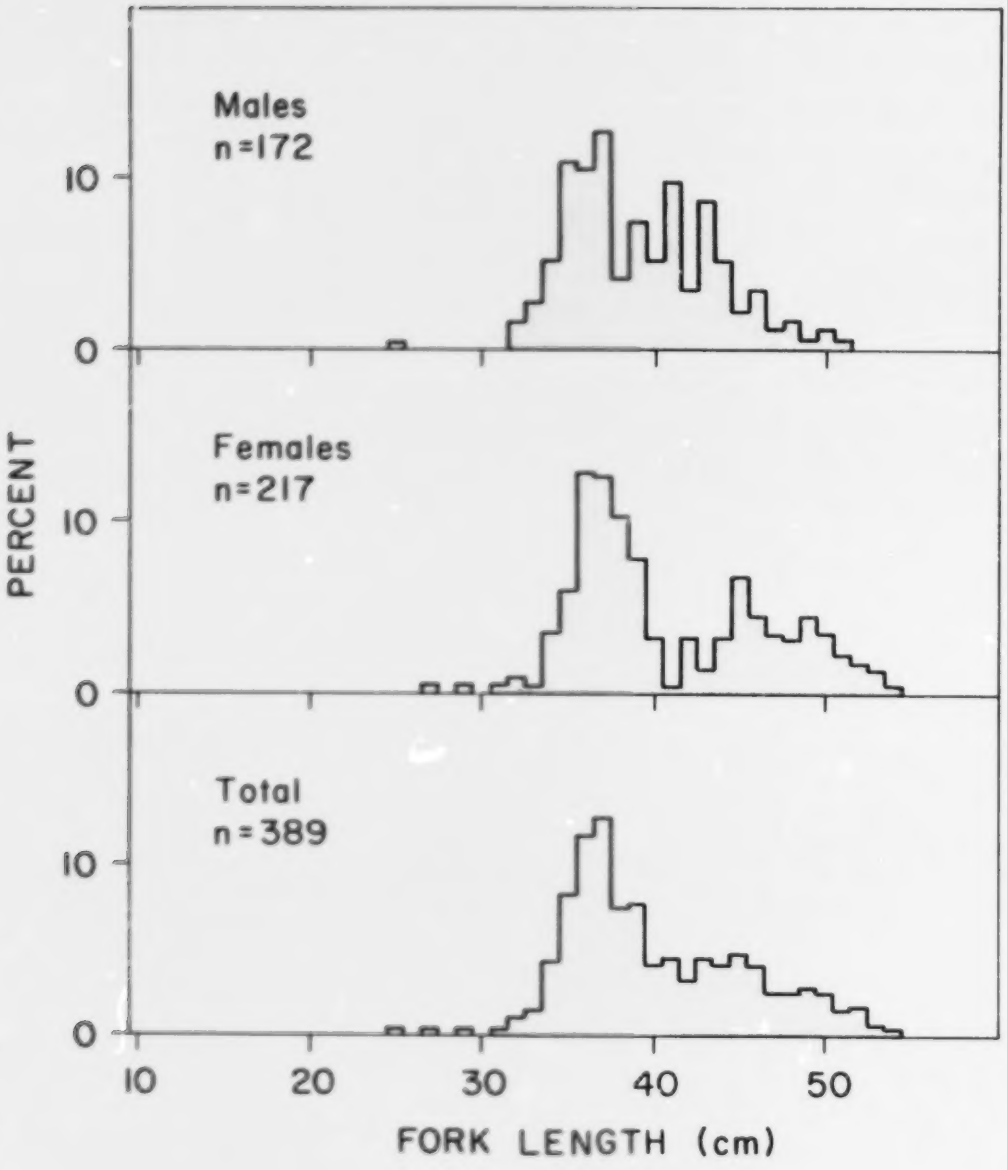


Fig. 17. Length frequency histogram by sex for walleye pollock collected off the west coast of Vancouver Island and the State of Washington, August 15 - September 5, 1983.

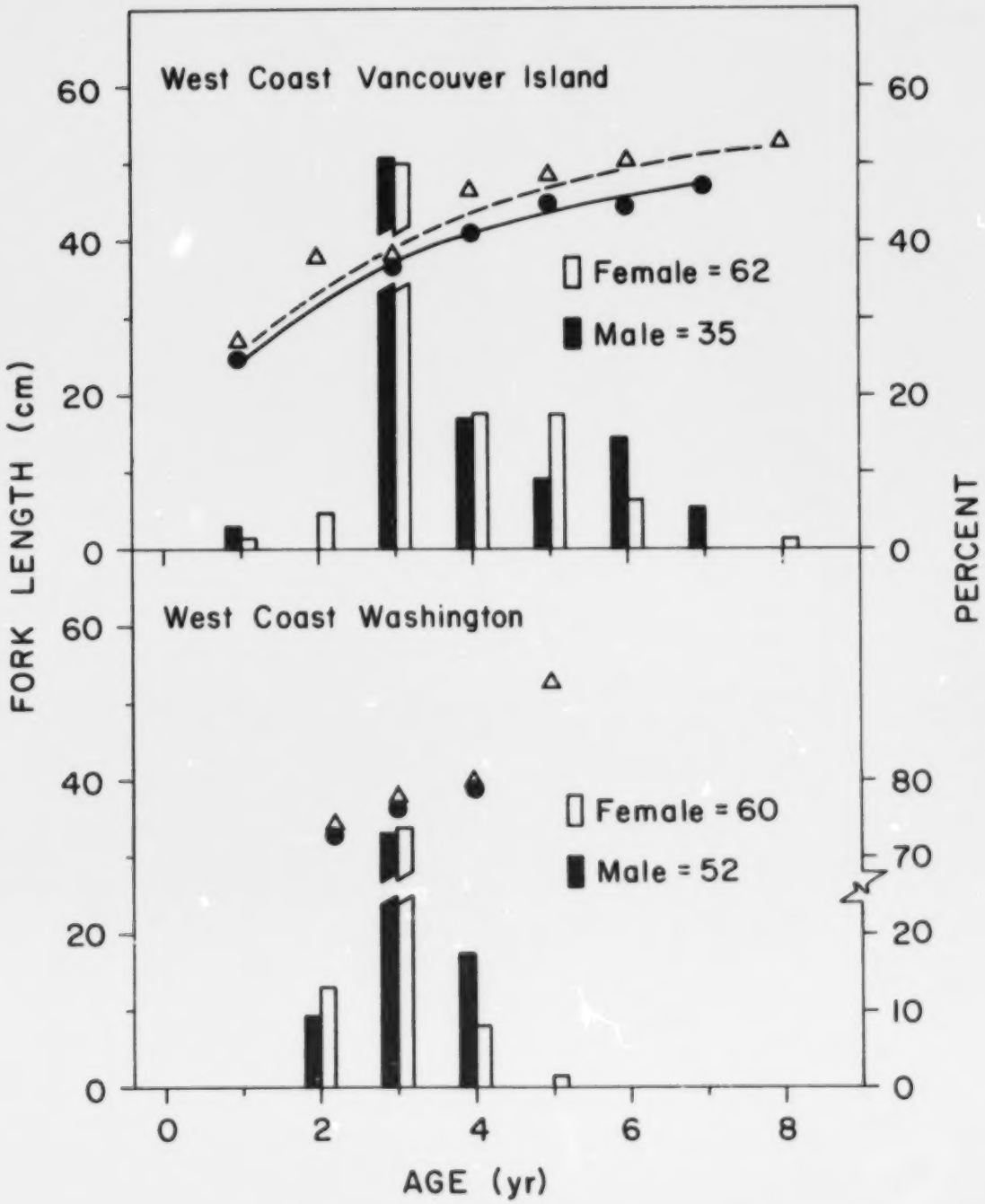


Fig. 18. Walleye pollock age frequency and mean length at age plots (curves for pollock in Canadian waters were fitted using von Bertalanffy parameters) by sex for the west coast of Vancouver Island, and the State of Washington, August 15 - September 5, 1983.

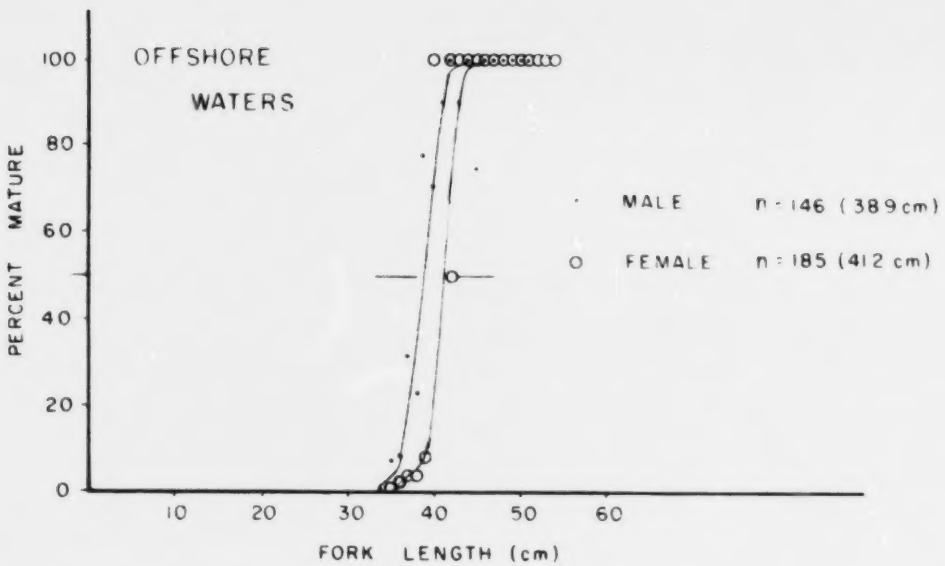


Fig. 19. Maturity ogive (length at 50%) for walleye pollock by sex collected off the west coast of Vancouver Island and the State of Washington, August 15 - September 5, 1983.

Appendix table 1. Fishing log for R/V G.B. REED, off west coast Vancouver Island, August 15-21, 1983. (see footnotes Appendix table 1 and 2)

HAUL NUMBER		1	2	3	4
DATE		AUG 18	AUG 19	AUG 19	AUG 19
AREA (MAJOR, MINOR)		3C,21	3C,23[a]	3C,23[a]	3C,23[a]
START TIME	PST)	10:51	9:58	11:22	13:47
DURATION	(MIN)	29	30	30	30
START N. LAT.	(DEG)	48	48	48	48
	(MIN)	29.7	53.2	52.8	57.5
W. LONG	(DEG)	124	125	125	125
	(MIN)	59.9	12.8	13.0	10.4
FINISH N. LAT.	(DEG)	48	48	48	48
	(MIN)	31.0	52.5	51.8	56.1
W. LONG	(DEG)	124	125	125	125
	(MIN)	59.1	14.3	14.4	11.5
HAUL DISTANCE	(KM)	2.4	2.6	2.6	2.8
	(N MI)	1.3	1.4	1.4	1.5
DIRECTION (DEG.TRUE)		27	0	0	208
BOTTOM DEPTH	(M)	97- 62	88- 93	91- 91	97- 97
	(FM)	53- 34	48- 51	50- 50	53- 53
MODAL DEPTH	(M)	81	90	91	97
NET/GEAR DEPTH	(M)	73- 55	..- ..	..- ..	..- ..
	(FM)	40- 30	..- ..	..- ..	..- ..
MODAL NET DEPTH	(M)	64	..	..	..
GEAR TYPE		221	105	105	105
TOTAL CATCH	(KG)	0	58	39	352
REMARKS		NOT USABLE	USABLE	USABLE	USABLE

Appendix table 1 (cont'd)

HAUL NUMBER	1	2	3	4
DATE	AUG 18	AUG 19	AUG 19	AUG 19
PACIFIC HAKE	..	57	27	204
WALLEYE POLLOCK	..	..	1	19
ARROWTOOTH FLOUNDER	..	..	..	3
DOVER SOLE	..	..	..	4
ENGLISH SOLE	..	..	..	16
FLATHEAD SOLE	..	..	1	22
REX SOLE	..	..	2	..
SLENDER SOLE	..	..	1	..
S. BABCOCKI	..	..	..	..
S. CAURINUS	..	..	..	..
S. FLAVIDUS	..	..	..	..
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. RUBERRIMUS	..	..	..	..
EELPOUTS	..	..	..	..
EULACHON	..	..	1	20
LINGCOD	..	..	..	10
PACIFIC COD	..	..	..	..
PACIFIC TOMCOD	..	..	..	..
PLAINFIN MIDSHIPMAN	..	..	2	17
SABLEFISH	..	..	..	..
RATFISH	..	..	2	3
SKATES	..	..	..	..
SPINY DOGFISH	..	..	..	11
PINK SHRIMP	..	..	1	20
PRAWN	..	..	..	..
SHRIMP	..	1	..	..
SIDESTRIPE SHRIMP	..	..	1	3
SQUID	..	..	..	..
TOTAL CATCH (KG)	0	58	39	352

Appendix table 1 (cont'd)

HAUL NUMBER	5	6	7	8
DATE	AUG 19	AUG 20	AUG 20	AUG 20
AREA (MAJOR, MINOR)	3C,23[a]	3C,24[b]	3C,24[b]	3C,24[b]
START TIME (PST)	15:58	10:05	13:06	15:08
DURATION (MIN)	30	30	30	30
START N. LAT. (DEG)	48	49	49	49
(MIN)	52.5	24.8	23.9	25.2
W. LONG (DEG)	125	126	126	126
(MIN)	12.1	7.4	14.4	14.5
FINISH N. LAT. (DEG)	48	49	49	49
(MIN)	51.2	25.5	22.6	23.8
W. LONG (DEG)	125	126	126	126
(MIN)	13.6	5.3	14.6	14.7
HAUL DISTANCE (KM)	3.0	3.0	2.4	2.6
(N MI)	1.6	1.6	1.3	1.4
DIRECTION (DEG.TRUE)	219	65	184	187
BOTTOM DEPTH (M)	86- 84	150- 163	66- 59	68- 66
(FM)	47- 46	82- 89	36- 32	37- 36
MODAL DEPTH (M)	85	157	62	67
NET/GEAR DEPTH (M)	..- ..	..- ..	..- ..	..- ..
(FM)	..- ..	..- ..	..- ..	..- ..
MODAL NET DEPTH (M)	..	..	..	..
GEAR TYPE	105	105	105	105
TOTAL CATCH (KG)	437	180	1619	556
REMARKS	USABLE	USABLE	USABLE	USABLE

Appendix table 1 (cont'd)

HAUL NUMBER	5	6	7	8
DATE	AUG 19	AUG 20	AUG 20	AUG 20
PACIFIC HAKE	39	14	371	332
WALLEYE POLLOCK	8	..	17	..
ARROWTOOTH FLOUNDER	22	..	..	..
DOVER SOLE	..	..	..	..
ENGLISH SOLE	6	..	36	12
FLATHEAD SOLE	47	..	..	2
REX SOLE	..	..	..	..
SLENDER SOLE	..	38	5	6
S. BABCOCKI	..	..	..	..
S. CAURINUS	..	9	..	..
S. FLAVIDUS	..	..	..	..
S. PAUCISPINIS	..	19	401	4
S. PINNIGER	..	9	12	10
S. RUBERRIMUS	..	20	..	..
EELPOUTS	..	..	8	24
EULACHON	23	4	..	..
LINGCOD	7	4	45	24
PACIFIC COD	..	..	3	..
PACIFIC TOMCOD	8	..	2	..
PLAINFIN MIDSHIPMAN	61	..	4	24
SABLEFISH	..	..	..	..
RATFISH	82	50	265	87
SKATES	80	4	..	..
SPINY DOGFISH	42	7	450	29
PINK SHRIMP	12	..	..	..
PRAWN	..	1	..	1
SHRIMP	..	..	..	..
SIDESTRIPE SHRIMP	..	1	..	1
SQUID	..	..	..	..
TOTAL CATCH (KG)	437	180	1619	556

Appendix table 1 (cont'd)

HAUL NUMBER		9	10	11
DATE		AUG 21	AUG 21	AUG 21
AREA (MAJOR, MINOR)		3C,25	3C,25	3C,25
START TIME	(PST)	9:46	14:19	15:55
DURATION	(MIN)	40	20	33
START N. LAT.	(DEG)	49	49	49
	(MIN)	36.9	34.9	34.1
W. LONG	(DEG)	126	126	126
	(MIN)	36.1	36.0	36.7
FINISH N. LAT.	(DEG)	49	49	49
	(MIN)	38.4	34.1	33.4
W. LONG	(DEG)	126	126	126
	(MIN)	36.2	37.0	38.8
HAUL DISTANCE	(KM)	2.6	2.0	3.0
	(N MI)	1.4	1.1	1.6
DIRECTION (DEG.TRUE)		0	217	247
BOTTOM DEPTH	(M)	165- 165	91- 90	86- 84
	(FM)	90- 90	50- 49	47- 46
MODAL DEPTH	(M)	165	91	85
NET/GEAR DEPTH	(M)	..- ..	..- ..	..- ..
	(FM)	..- ..	..- ..	..- ..
MODAL NET DEPTH	(M)	..	..	..
GEAR TYPE		105	105	105
TOTAL CATCH	(KG)	16	189	397
REMARKS		USABLE	USABLE	USABLE

Appendix table 1 (cont'd)

HAUL NUMBER	9	10	11
DATE	AUG 21	AUG 21	AUG 21
PACIFIC HAKE	4	6	9
WALLEYE POLLOCK	3	2	3
ARROWTOOTH FLOUNDER	..	..	..
DOVER SOLE	..	..	9
ENGLISH SOLE	..	..	20
FLATHEAD SOLE	..	23	20
REX SOLE	..	..	..
SLENDER SOLE	..	..	..
S. BABCOCKI	1	..	..
S. CAURINUS	..	..	..
S. FLAVIDUS	..	3	..
S. PAUCISPINIS	..	8	7
S. PINNIGER	..	1	..
S. RUBERRIMUS	..	..	..
EELPOUTS	..	..	..
EULACHON	..	..	..
LINGCOD	..	..	..
PACIFIC COD	4	..	..
PACIFIC TOMCOD	..	..	..
PLAINFIN MIDSHIPMAN	..	..	..
SABLEFISH	4	..	3
RATFISH	..	76	252
SKATES	..	..	6
SPINY DOGFISH	..	33	25
PINK SHRIMP	..	35	21
PRAWN	..	1	21
SHRIMP	..	..	..
SIDESTRIPE SHRIMP	..	1	..
SQUID	..	..	1
TOTAL CATCH (KG)	16	189	397

Appendix table 2. Fishing log for F/V MARWOOD, off west coast Vancouver Island and Washington, August 25-September 5, 1983. (See footnotes Appendix table 1 and 2)

HAUL NUMBER		1	2	3	4
DATE		AUG 25	AUG 25	AUG 26	AUG 26
AREA (MAJOR, MINOR)		3C,23	3C,23	3C,23	3C,23
START TIME	(PST)	17:04	17:36	7:34	9:52
DURATION	(MIN)	30	30	30	30
START N. LAT.	(DEG)	48	48	48	48
	(MIN)	34.0	29.7	34.0	32.7
W. LONG	(DEG)	125	125	125	125
	(MIN)	18.6	23.2	24.0	22.4
FINISH N. LAT.	(DEG)	48	48	48	48
	(MIN)	33.9	30.3	33.8	31.1
W. LONG	(DEG)	125	125	125	125
	(MIN)	15.8	19.9	20.9	22.6
HAUL DISTANCE	(KM)	3.3	4.1	3.5	3.0
	(N MI)	1.8	2.2	1.9	1.6
DIRECTION (DEG.TRUE)		93	71	104	184
BOTTOM DEPTH	(M)	108- 108	146- 144	153- 141	135- 145
	(FM)	59- 59	80- 79	84- 77	74- 79
MODAL DEPTH	(M)	108	145	147	140
NET/GEAR DEPTH	(M)	82- 82	88- 88	99- 99	110- 117
	(FM)	45- 45	48- 48	54- 54	60- 64
MODAL NET DEPTH	(M)	82	101	106	114
GEAR TYPE		221	221	221	221
TOTAL CATCH	(KG)	363	431	72	1433
REMARKS		USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY		L 73-	H 95-	L 95-	M 108-
DEPTH	(M)	108	117	124	128

Appendix table 2 (cont'd)

HAUL NUMBER	1	2	3	4
DATE	AUG 25	AUG 25	AUG 26	AUG 26
PACIFIC HAKE	..	424	61	1417
WALLEYE POLLOCK	..	..	1	2
ARROWTOOTH FLOUNDER	..	3	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	318	..	..	6
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	45	..	..	..
CHINOOK SALMON	..	..	..	..
COHO SALMON	..	..	..	..
EULACHON	..	..	..	..
LINGCOD	..	..	2	4
PACIFIC HERRING	..	..	..	..
PINK SALMON	..	..	..	..
SABLEFISH	..	..	..	..
SKATES	..	..	..	..
SPINY DOGFISH	..	4	8	4
TOTAL CATCH (KG)	363	431	72	1433

Appendix table 2 (cont'd)

HAUL NUMBER	5	6	7	8
DATE	AUG 26	AUG 26	AUG 26	AUG 26
AREA (MAJOR, MINOR)	3C,23	3C,23	3C,23	3C,23
START TIME (PST)	13:22	14:45	16:20	17:58
DURATION (MIN)	15	20	14	20
START N. LAT. (DEG)	48	48	48	48
(MIN)	31.2	28.6	30.0	28.1
W. LONG (DEG)	125	125	125	125
(MIN)	21.6	19.4	18.6	23.5
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	24.6	28.6	29.7	29.1
W. LONG (DEG)	125	125	125	125
(MIN)	21.4	20.6	17.3	24.3
HAUL DISTANCE (KM)	3.0	1.3	1.9	2.2
(N MI)	1.6	0.7	1.0	1.2
DIRECTION (DEG.TRUE)	0	0	96	0
BOTTOM DEPTH (M)	124- 148	157- 157	146- 148	155- 152
(FM)	68- 81	86- 86	80- 81	85- 83
MODAL DEPTH (M)	136	157	147	153
NET/GEAR DEPTH (M)	73- 93	121- 110	110- 104	101- 95
(FM)	40- 51	66- 60	60- 57	55- 52
MODAL NET DEPTH (M)	96	123	113	108
GEAR TYPE	221	221	221	221
TOTAL CATCH (KG)	1110	935	997	1339
REMARKS	USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY DEPTH (M)	H 106-135	M 110-146	M TO H 113-135	H 113-124

Appendix table 2 (cont'd)

HAUL NUMBER	5	6	7	8
DATE	AUG 26	AUG 26	AUG 26	AUG 26
PACIFIC HAKE	1049	922	953	1306
WALLEYE POLLOCK	7	13	42	33
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	..	..	2	..
S. PAUCISPINIS	7	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	18	..	..	..
CHINOOK SALMON	3	..	..	..
COHO SALMON	..	..	..	..
EULACHON	..	..	..	..
LINGCOD	..	..	..	..
PACIFIC HERRING	..	..	..	..
PINK SALMON	..	..	..	..
SABLEFISH	..	..	..	..
SKATES	18	..	..	..
SPINY DOGFISH	8	..	..	..
TOTAL CATCH (KG)	1110	935	997	1339

Appendix table 2 (cont'd)

HAUL NUMBER		9	10	11	12
DATE		AUG 26	AUG 27	AUG 27	AUG 27
AREA (MAJOR, MINOR)		3C,23	3C,23	3C,23	3C,21
START TIME	(PST)	20:30	10:50	13:58	17:55
DURATION	(MIN)	15	15	15	25
START N. LAT.	(DEG)	48	48	48	48
	(MIN)	35.8	28.9	32.7	31.4
W. LONG	(DEG)	125	125	125	124
	(MIN)	42.4	13.8	18.3	56.8
FINISH N. LAT.	(DEG)	48	48	48	48
	(MIN)	34.9	28.9	34.0	31.0
W. LONG	(DEG)	125	125	125	124
	(MIN)	40.2	12.8	17.4	58.4
HAUL DISTANCE	(KM)	1.5	1.5	1.5	2.2
	(N MI)	0.8	0.8	0.8	1.2
DIRECTION (DEG.TRUE)		0	0	0	0
BOTTOM DEPTH	(M)	62- 62	146- 146	117- 110	70- 71
	(FM)	34- 34	80- 80	64- 60	38- 39
MODAL DEPTH	(M)	62	146	114	70
NET/GEAR DEPTH	(M)	35- 35	113- 110	81- 81	37- 37
	(FM)	19- 19	62- 60	44- 44	20- 20
MODAL NET DEPTH	(M)	35	116	82	40
GEAR TYPE		221	221	221	221
TOTAL CATCH	(KG)	1050	1228	500	500
REMARKS		USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY			M TO H	H STREAKS	L HAZE 31
DEPTH	(M)		113-135	76-95	-40

Appendix table 2 (cont'd)

HAUL NUMBER	9	10	11	12
DATE	AUG 26	AUG 27	AUG 27	AUG 27
PACIFIC HAKE	..	1220	..	..
WALLEYE POLLOCK	..	2	..	..
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	..	..	..	..
S. ENTOMELAS	..	..	75	..
S. FLAVIDUS	..	..	400	250
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	25	7
CHINOOK SALMON	..	4	..	..
COHO SALMON	..	..	..	..
EULACHON	..	..	..	..
LINGCOD	..	..	..	..
PACIFIC HERRING	50	..	..	..
PINK SALMON	..	..	..	3
SABLEFISH	..	..	..	..
SKATES	..	..	..	..
SPINY DOGFISH	1000	4	..	240
TOTAL CATCH (KG)	1050	1228	500	500

Appendix table 2 (cont'd)

HAUL NUMBER	13	14	15	16
DATE	AUG 27	AUG 27	AUG 29	AUG 29
AREA (MAJOR, MINOR)	3C,21	3B,30	3B,30	3B,30
START TIME (PST)	19:56	16:17	7:25	10:06
DURATION (MIN)	27	4	20	7
START N. LAT. (DEG)	48	48	47	48
(MIN)	31.9	27.5	59.6	2.8
W. LONG (DEG)	124	124	124	124
(MIN)	52.2	27.6	59.0	58.4
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	32.5	19.4	0.2	2.8
W. LONG (DEG)	124	124	124	124
(MIN)	50.4	19.3	57.4	59.4
HAUL DISTANCE (KM)	2.6	0.6	2.4	1.1
(N MI)	1.4	0.3	1.3	0.6
DIRECTION (DEG.TRUE)	0	0	0	272
BOTTOM DEPTH (M)	134- 121	110- 110	104- 97	102- 108
(FM)	73- 66	60- 60	57- 53	56- 59
MODAL DEPTH (M)	128	110	100	106
NET/GEAR DEPTH (M)	84- 84	55- 70	68- 62	75- 71
(FM)	46- 46	30- 38	37- 34	41- 39
MODAL NET DEPTH (M)	89	63	64	77
GEAR TYPE	221	221	221	221
TOTAL CATCH (KG)	4000	16	1865	1065
REMARKS	USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY	M 37-	H 62-	M 70-	H 73-
DEPTH (M)	88	77	99	91

Appendix table 2 (cont'd)

HAUL NUMBER	13	14	15	16
DATE	AUG 27	AUG 27	AUG 29	AUG 29
PACIFIC HAKE	1000	5	1863	1063
WALLEYE POLLOCK	500	..	..	..
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	1	..
S. BREVISPINIS	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	..	1	..	..
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	..	..
CHINOOK SALMON	..	3	..	..
COHO SALMON	..	..	..	..
EULACHON	..	2	..	..
LINGCOD	..	..	..	..
PACIFIC HERRING	..	..	1	2
PINK SALMON	..	..	..	..
SABLEFISH	..	..	..	..
SKATES	..	..	..	..
SPINY DOGFISH	2500	5	..	..
TOTAL CATCH (KG)	4000	16	1865	1065

Appendix table 2 (cont'd)

HAUL NUMBER	17	18	19	20
DATE	AUG 29	AUG 29	AUG 29	AUG 30
AREA (MAJOR, MINOR)	3B,30	3B,30	3B,30	3B,30
START TIME (PST)	13:27	17:30	20:43	10:50
DURATION (MIN)	30	28	20	55
START N. LAT. (DEG)	47	48	48	48
(MIN)	55.9	5.1	7.6	8.0
W. LONG (DEG)	125	125	125	125
(MIN)	26.2	20.3	7.3	39.2
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	0.8	5.6	7.6	7.8
W. LONG (DEG)	125	125	125	125
(MIN)	24.2	18.6	8.6	41.0
HAUL DISTANCE (KM)	3.0	2.2	1.7	5.7
(N MI)	1.6	1.2	0.9	3.1
DIRECTION (DEG.TRUE)	0	0	0	97
BOTTOM DEPTH (M)	187- 482	188- 251	260- 232	196- 220
(FM)	102- 264	103- 137	142- 127	107- 120
MODAL DEPTH (M)	400	220	246	208
NET/GEAR DEPTH (M)	172- 168	166- 174	132- 132	152- 201
(FM)	94- 92	91- 95	72- 72	83- 110
MODAL NET DEPTH (M)	187	170	132	182
GEAR TYPE	221	221	221	221
TOTAL CATCH (KG)	1131	1108	314	1447
REMARKS	USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY DEPTH (M)	L 128-165	H 143-179	VL 128-251	L 128-201

Appendix table 2 (cont'd)

HAUL NUMBER	17	18	19	20
DATE	AUG 29	AUG 29	AUG 29	AUG 30
PACIFIC HAKE	1131	1077	293	1432
WALLEYE POLLOCK	..	..	1	1
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	..	4	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	..	10	..	14
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	1	2	..
S. PRORIGER	..	16	..	..
CHINOOK SALMON	..	..	..	..
COHO SALMON	..	..	..	..
EULACHON	..	..	..	..
LINGCOD	..	..	..	..
PACIFIC HERRING	..	..	..	..
PINK SALMON	..	..	..	..
SABLEFISH	..	..	..	..
SKATES	..	..	..	..
SPINY DOGFISH	..	..	18	..
TOTAL CATCH (KG)	1131	1108	314	1447

Appendix table 2 (cont'd)

HAUL NUMBER	21	22	23	24
DATE	AUG 30	AUG 30	AUG 30	AUG 31
AREA (MAJOR, MINOR)	3B,30	3B,30	3B,30	3B,30
START TIME (PST)	13:20	15:51	18:08	8:05
DURATION (MIN)	9	10	35	15
START N. LAT. (DEG)	48	48	48	48
(MIN)	10.0	10.5	10.1	7.9
W. LONG (DEG)	125	125	125	124
(MIN)	39.6	35.8	22.8	58.2
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	10.0	10.9	10.2	7.3
W. LONG (DEG)	125	125	125	124
(MIN)	38.8	35.0	18.3	59.9
HAUL DISTANCE (KM)	1.1	1.1	5.4	2.4
(N MI)	0.6	0.6	2.9	1.3
DIRECTION (DEG.TRUE)	299	312	95	272
BOTTOM DEPTH (M)	172- 179	155- 155	110- 187	154- 324
(FM)	94- 98	85- 85	60- 102	84- 177
MODAL DEPTH (M)	177	155	148	239
NET/GEAR DEPTH (M)	146- 143	132- 128	88- 91	131- 128
(FM)	80- 78	72- 70	48- 50	72- 70
MODAL NET DEPTH (M)	145	130	90	129
GEAR TYPE	221	221	221	221
TOTAL CATCH (KG)	527	2545	6	94
REMARKS	USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY DEPTH (M)	H 119-166	L 84-121; H 124-150	VL 80-95	L 106-146

Appendix table 2 (cont'd)

HAUL NUMBER	21	22	23	24
DATE	AUG 30	AUG 30	AUG 30	AUG 31
PACIFIC HAKE	908	2521	..	91
WALLEYE POLLOCK	..	..	..	3
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	10	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	8	20	3	..
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	3	..
CHINOOK SALMON	..	..	..	..
COHO SALMON	..	..	..	..
EULACHON	..	..	..	..
LINGCOD	..	..	..	..
PACIFIC HERRING	..	..	..	..
PINK SALMON	..	..	..	..
SABLEFISH	1	2	..	..
SKATES	..	..	..	..
SPINY DOGFISH	..	2	..	..
TOTAL CATCH (KG)	927	2545	6	94

Appendix table 2 (cont'd)

HAUL NUMBER	25	26	27	28
DATE	AUG 31	AUG 31	AUG 31	AUG 31
AREA (MAJOR, MINOR)	3B,30	3B,30	3C,21	3C,21
START TIME (PST)	11:54	15:02	18:17	19:45
DURATION (MIN)	12	30	20	11
START N. LAT. (DEG)	48	48	48	48
(MIN)	14.9	20.5	30.2	28.5
W. LONG (DEG)	125	125	124	124
(MIN)	55.8	13.2	53.2	55.8
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	16.1	21.4	29.4	28.1
W. LONG (DEG)	125	125	124	124
(MIN)	56.0	11.6	53.0	55.1
HAUL DISTANCE (KM)	2.2	2.6	1.7	1.1
(N MI)	1.2	1.4	0.9	0.6
DIRECTION (DEG.TRUE)	340	48	0	0
BOTTOM DEPTH (M)	146- 168	183- 177	79- 155	148- 139
(FM)	80- 92	100- 97	43- 85	81- 76
MODAL DEPTH (M)	157	180	109	142
NET/GEAR DEPTH (M)	128- 141	154- 150	70- 73	113- 113
(FM)	70- 77	84- 82	38- 40	62- 62
MODAL NET DEPTH (M)	134	152	71	113
GEAR TYPE	221	221	221	221
TOTAL CATCH (KG)	176	470	2500	1491
REMARKS	USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY DEPTH (M)	L 113-143	L 128-165	L 27-110; M 73-106	VH 59-102

Appendix table 2 (cont'd)

HAUL NUMBER	25	26	27	28
DATE	AUG 31	AUG 31	AUG 31	AUG 31
PACIFIC HAKE	114	466	500	1002
WALLEYE POLLOCK	52	2	..	..
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	2	2	..	2
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	..	..
CHINOOK SALMON	5	..	..	..
COHO SALMON	..	..	..	..
EULACHON	..	..	..	..
LINGCOD	..	..	..	..
PACIFIC HERRING	..	..	..	..
PINK SALMON	..	..	..	..
SABLEFISH	..	..	..	..
SKATES	..	..	..	..
SPINY DOGFISH	3	..	2000	487
TOTAL CATCH (KG)	176	470	2500	1491

Appendix table 2 (cont'd)

HAUL NUMBER	29	30	31	32
DATE	SEP 1	SEP 1	SEP 1	SEP 1
AREA (MAJOR, MINOR)	3C,23	3C,23	3C,23	3C,23
START TIME (PST)	8:20	11:18	14:30	19:45
DURATION (MIN)	30	31	28	13
START N. LAT. (DEG)	48	48	48	48
(MIN)	16.4	18.3	24.5	30.3
W. LONG (DEG)	125	125	125	125
(MIN)	46.4	48.6	53.7	34.2
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	15.8	19.2	23.1	30.8
W. LONG (DEG)	125	125	125	125
(MIN)	48.8	51.3	53.1	27.8
HAUL DISTANCE (KM)	3.3	3.5	2.8	1.9
(N MI)	1.8	1.9	1.5	1.0
DIRECTION (DEG.TRUE)	262	337	0	82
BOTTOM DEPTH (M)	181- 212	181- 179	216- 251	124- 133
(FM)	99- 116	99- 98	118- 137	68- 73
MODAL DEPTH (M)	191	180	233	129
NET/GEAR DEPTH (M)	155- 183	132- 133	161- 201	106-106
(FM)	85- 100	72- 73	88- 110	58- 58
MODAL NET DEPTH (M)	169	132	181	106
GEAR TYPE	221	221	221	221
TOTAL CATCH (KG)	331	962	207	560
REMARKS	USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY	H 117-157;L 154-178	H 106-146	L 99-132	L 88-102

Appendix table 2 (cont'd)

HAUL NUMBER	29	30	31	32
DATE	SEP 1	SEP 1	SEP 1	SEP 1
PACIFIC HAKE	328	913	185	558
WALLEYE POLLOCK	..	..	..	..
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	3	1	3	2
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	48	19	..
CHINOOK SALMON	..	..	..	..
COHO SALMON	..	..	..	..
EULACHON	..	..	..	..
LINGCOD	..	..	..	..
PACIFIC HERRING	..	..	..	..
PINK SALMON	..	..	..	..
SABLEFISH	..	..	..	..
SKATES	..	..	..	..
SPINY DOGFISH	..	..	..	..
TOTAL CATCH (KG)	331	962	207	560

Appendix table 2 (cont'd)

HAUL NUMBER	33	34	35	36
DATE	SEP 2	SEP 2	SEP 2	SEP 2
AREA (MAJOR, MINOR)	3C,23	3C,23	3C,23	3C,23
START TIME (PST)	8:20	11:20	13:49	15:29
DURATION (MIN)	18	15	9	20
START N. LAT. (DEG)	48	48	48	48
(MIN)	34.7	41.0	44.5	45.6
W. LONG (DEG)	125	125	125	125
(MIN)	34.8	50.0	40.6	35.8
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	35.0	42.0	44.2	45.9
W. LONG (DEG)	125	125	125	125
(MIN)	33.3	49.3	41.2	34.1
HAUL DISTANCE (KM)	2.0	2.6	1.1	2.0
(N MI)	1.1	1.4	0.6	1.1
DIRECTION (DEG.TRUE)	72	302	0	69
BOTTOM DEPTH (M)	126- 123	64- 66	185- 174	165- 145
(FM)	69- 67	35- 36	101- 95	90- 79
MODAL DEPTH (M)	124	65	179	155
NET/GEAR DEPTH (M)	104- 102	46- 46	115- 115	146- 124
(FM)	57- 56	25- 25	63- 63	80- 68
MODAL NET DEPTH (M)	103	46	115	135
GEAR TYPE	221	221	221	221
TOTAL CATCH (KG)	1169	261	3658	1018
REMARKS	USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY DEPTH (M)	H 102-124	H STREAKS 22-62;H 59-62	H 113-150	H 106-146

Appendix table 2 (cont'd)

HAUL NUMBER	33	34	35	36
DATE	SEP 2	SEP 2	SEP 2	SEP 2
PACIFIC HAKE	1107	3	3655	1017
WALLEYE POLLOCK	59	..	..	..
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	2	..	..	..
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	..	..
CHINOOK SALMON	..	3	..	..
COHO SALMON	..	3	..	..
EULACHON	..	..	..	1
LINGCOD	..	..	3	..
PACIFIC HERRING	..	250	..	..
PINK SALMON	1	..	..	..
SABLEFISH	..	..	..	..
SKATES	..	..	..	..
SPINY DOGFISH	..	2	..	..
TOTAL CATCH (KG)	1169	261	3658	1018

Appendix table 2 (cont'd)

HAUL NUMBER	37	38	39	40
DATE	SEP 3	SEP 4	SEP 5	SEP 5
AREA (MAJOR, MINOR)	3C,23	3C,23	3C,23	3C,24
START TIME (PST)	17:24	9:48	9:17	13:11
DURATION (MIN)	4	8	5	5
START N. LAT. (DEG)	48	48	48	48
(MIN)	35.1	36.0	57.0	57.3
W. LONG (DEG)	126	125	125	126
(MIN)	5.4	37.0	45.1	12.8
FINISH N. LAT. (DEG)	48	48	48	48
(MIN)	34.8	36.5	56.8	57.2
W. LONG (DEG)	126	125	125	126
(MIN)	5.2	36.2	44.8	12.2
HAUL DISTANCE (KM)	0.7	1.7	0.7	0.7
(N MI)	0.4	0.9	0.4	0.4
DIRECTION (DEG.TRUE)	140	72	0	144
BOTTOM DEPTH (M)	154- 154	119- 123	86- 68	108- 108
(FM)	84- 84	65- 67	47- 37	59- 59
MODAL DEPTH (M)	154	121	86	108
NET/GEAR DEPTH (M)	128- 128	81- 86	68- 68	71- 71
(FM)	70- 70	44- 47	37- 37	39- 39
MODAL NET DEPTH (M)	128	84	68	71
GEAR TYPE	222	222	222	222
TOTAL CATCH (KG)	6590	669	6819	4101
REMARKS	USABLE	USABLE	USABLE	USABLE
SOUNDER SUMMARY DEPTH (M)	H 102-121	M 95-117	H 59-84	L 51-70;H 70-84

Appendix table 2 (cont'd)

HAUL NUMBER	37	38	39	40
DATE	SEP 3	SEP 4	SEP 5	SEP 5
PACIFIC HAKE	6363	651	6818	4091
WALLEYE POLLOCK	..	18	..	..
ARROWTOOTH FLOUNDER	..	..	..	..
PACIFIC SANDDAB	..	..	..	..
S. BREVISPINIS	..	..	..	..
S. ENTOMELAS	..	..	..	..
S. FLAVIDUS	227	..	..	..
S. PAUCISPINIS	..	..	..	..
S. PINNIGER	..	..	..	..
S. PRORIGER	..	..	..	..
CHINOOK SALMON	..	..	1	..
COHO SALMON	..	..	..	..
EULACHON	..	..	..	..
LINGCOD	..	..	..	10
PACIFIC HERRING	..	..	..	..
PINK SALMON	..	..	..	..
SABLEFISH	..	..	..	..
SKATES	..	..	..	..
SPINY DOGFISH	..	..	..	..
TOTAL CATCH (KG)	6590	669	6819	4101

Footnotes to Appendix tables 1 and 2.

Area:	Major area	3C	Southwest Vancouver Island
		3B	Northwest Washington State
	Minor area	21	Swiftsure Bank
		23a	Barkley Sound
		23	Finger Bank
		24b	Sidney Inlet
		24	Lennard Island
		25	Nootka Sound
		30	Gray's Harbour
PST:			Pacific Standard Time
Gear type:		105	Gulf semi-balloon shrimp bottom trawl (Maronovich trawl)
		221	Diamond 5 midwater trawl
		222	Diamond 8 midwater trawl
Total catch:			Total weight of catch in kilograms.
Sound summary:			VL = very light concentration layer L = light concentration layer M = medium concentration layer H = heavy concentration layer The concentration layer, as seen on the echo sounder, looks like a spotting pattern of discrete schools of fish, or a series of longitudinal bands of schools of fish which vary in concentration.

Appendix table 3. Common and scientific names of species captured on both R/V G.B. REED and F/V MARWOOD cruises.

Common name	Scientific name
Pacific hake	*Merluccius productus*
Walleye pollock	*Theragra chalcogramma*
Arrowtooth flounder	*Atherestes stomias*
Dover sole	*Microstomus pacificus*
English sole	*Parophrys vetulus*
Flathead sole	*Hippoglossoides elassodon*
Rex sole	*Glyptocephalus zachirus*
Slender sole	*Lyopsetta exilis*
Silvergrey rockfish	*Sebastes brevispinis*
Widow rockfish	*Sebastes entomelas*
Yellowtail rockfish	*Sebastes flavidus*
Bocaccio	*Sebastes paucispinis*
Canary rockfish	*Sebastes pinniger*
Redstripe rockfish	*Sebastes proriger*
Redbanded rockfish	*Sebastes babcocki*
Copper rockfish	*Sebastes caurinus*
Yelloweye rockfish	*Sebastes ruberrimus*
Chinook salmon	*Oncorhynchus tshawytscha*
Coho salmon	*Oncorhynchus kisutch*
Pink salmon	*Oncorhynchus gorbuscha*
Lingcod	*Ophiodon elongatus*
Pacific herring	*Clupea harengus pallasi*
Sablefish	*Anoplopoma fimbria*
Eelpout	Zoarcidae
Pacific cod	*Gadus macrocephalus*
Pacific tomcod	*Microgadus proximus*
Plainfin midshipman	*Porichthys notatus*
Ratfish	*Hydrolagus colliei*
Skates	Rajidae
Spiny dogfish	*Squalus acanthias*
Pink shrimp	*Pasiphaea pacificus*
Prawn	*Pandalus platyceros*
Shrimp	Nantantia
Sidestripe shrimp	*Pandalopsis dispar*
Squid	*Loligo* spp.

Appendix table 4. Pacific Hake length frequency. R/V G.B. REED, August 15-21, 1983.

Set no.	2			3			4			5		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
10	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	1	2	3	-	-	-
18	-	-	-	-	-	-	1	4	9	-	-	-
19	-	-	-	-	-	-	4	2	7	-	-	-
20	-	-	-	-	-	-	13	12	25	-	-	-
21	-	-	-	-	-	-	28	26	54	2	-	2
22	-	-	-	-	1	1	20	50	70	0	-	0
23	-	-	-	-	0	0	50	41	91	0	-	0
24	-	-	-	-	0	0	31	36	67	0	-	0
25	-	-	-	-	0	0	29	17	46	0	-	0
26	-	-	-	-	2	2	15	13	28	0	-	0
27	-	-	-	-	0	0	12	15	27	0	-	0
28	1	-	1	-	0	0	24	29	53	1	-	1
29	1	4	5	-	0	0	26	20	46	1	1	2
30	7	0	7	-	0	0	15	20	35	1	2	3
31	8	11	19	-	2	2	11	13	24	1	1	2
32	20	12	32	2	0	2	12	11	23	1	1	2
33	15	22	37	1	5	6	3	9	12	1	1	2
34	11	28	39	2	3	5	3	1	4	0	0	0
35	6	11	17	2	7	9	5	3	8	0	2	2
36	5	12	17	1	9	10	0	0	0	0	1	1
37	1	3	4	2	4	6	0	0	0	3	0	3
38	-	1	1	2	4	6	1	1	2	0	0	0
39	-	2	2	0	3	3	1	2	3	0	0	0
40	-	1	1	0	0	0	-	1	1	0	0	0
41	-	-	-	1	0	1	-	2	2	0	0	0
42	-	-	-	0	0	0	-	0	0	0	0	0
43	-	-	-	0	0	0	-	0	0	0	0	0
44	-	-	-	0	1	1	-	0	0	0	0	0
45	-	-	-	0	0	0	-	0	0	0	0	0
46	-	-	-	0	0	0	-	1	1	0	0	0
47	-	-	-	0	0	0	-	0	0	0	0	0
48	-	-	-	0	0	0	-	2	2	0	1	1
49	-	-	-	0	0	0	-	0	0	1	0	1
50	-	-	-	0	0	0	-	0	0	0	0	0
51	-	-	-	0	1	1	-	0	0	1	1	2
52	-	-	-	0	1	1	-	0	0	2	1	3

Appendix table 4 (cont'd)

Set no. Fork length (cm)	2			3			4			5		
	M	F	T	M	F	T	M	F	T	M	F	T
53	-	-	-	0	0	0	-	2	2	0	3	3
54	-	-	-	1	0	1	-	0	0	3	1	4
55	-	-	-	1	0	1	-	1	1	1	2	3
56	-	-	-	-	0	0	-	0	0	1	0	1
57	-	-	-	-	1	1	-	0	0	-	3	3
58	-	-	-	-	1	1	-	1	1	-	1	1
59	-	-	-	-	1	1	-	2	2	-	0	0
60	-	-	-	-	-	-	-	0	0	-	1	1
61	-	-	-	-	-	-	-	3	3	-	0	0
62	-	-	-	-	-	-	-	1	1	-	0	0
63	-	-	-	-	-	-	-	2	2	-	4	4
64	-	-	-	-	-	-	-	1	1	-	1	1
65	-	-	-	-	-	-	-	-	-	-	-	-
66	-	-	-	-	-	-	-	-	-	-	-	-
67	-	-	-	-	-	-	-	-	-	-	-	-
68	-	-	-	-	-	-	-	-	-	-	-	-
69	-	-	-	-	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	75	107	182	15	46	61	305	346	656	20	28	48

Appendix table 4 (cont'd)

Set no. Fork length (cm)	6			7			8			10		
	M	F	T	M	F	T	M	F	T	M	F	T
10	-	-	-	1	-	1	-	-	-	-	-	-
11	-	-	-	0	-	0	-	-	-	-	-	-
12	-	-	-	0	-	0	-	-	-	-	-	-
13	-	-	-	0	-	0	-	-	-	-	1	1
14	-	-	-	0	-	0	-	-	-	1	2	3
15	-	-	-	0	-	0	1	1	2	0	1	1
16	-	-	-	1	-	1	1	3	4	1	1	2
17	-	-	-	1	-	1	13	10	23	5	3	8
18	-	1	1	6	5	11	29	34	63	4	6	10
19	-	1	1	10	15	25	48	45	93	7	8	15
20	-	1	1	36	33	69	47	48	95	9	9	18
21	1	0	1	40	37	77	33	44	77	10	9	19
22	0	0	0	25	30	55	18	20	38	2	5	7
23	1	0	1	16	18	34	9	10	19	2	1	3
24	0	0	0	13	11	24	6	2	8	1	1	2
25	0	0	0	5	4	9	1	2	3	-	-	-
26	0	0	0	4	4	8	1	0	1	-	-	-
27	0	2	2	2	5	7	2	0	2	-	-	-
28	1	2	3	3	4	7	3	2	5	-	-	-
29	1	1	2	11	3	14	4	4	8	-	-	-
30	2	5	7	6	7	13	4	8	12	-	-	-
31	2	0	2	4	11	15	2	7	9	-	-	-
32	4	3	7	7	10	17	5	8	13	-	-	-
33	1	3	4	3	10	13	7	6	13	-	-	-
34	4	2	6	6	8	14	7	11	18	-	-	-
35	0	2	2	15	14	29	3	16	19	-	-	-
36	2	1	3	13	8	21	10	16	26	-	-	-
37	-	0	0	4	16	20	2	10	12	-	-	-
38	-	1	1	2	13	15	3	12	15	-	-	-
39	-	1	1	-	9	9	0	5	5	-	-	-
40	-	0	0	-	2	2	1	2	3	-	-	-
41	-	0	0	-	3	3	1	2	3	-	-	-
42	-	0	0	-	1	1	-	2	2	-	-	-
43	-	1	1	-	2	2	-	5	5	-	-	-
44	-	0	0	-	0	0	-	1	1	-	-	-
45	-	0	0	-	0	0	-	1	1	-	-	-
46	-	0	0	-	1	1	-	1	1	-	-	-
47	-	0	0	-	1	1	-	1	1	-	-	-
48	-	0	0	-	-	-	-	2	2	-	-	-
49	-	0	0	-	-	-	-	1	1	-	-	-
50	-	0	0	-	-	-	-	0	0	-	-	-
51	-	0	0	-	-	-	-	0	0	-	-	-
52	-	1	1	-	-	-	-	1	1	-	-	-

Appendix table 4 (cont'd)

Set no. Fork length (cm)	6			7			8			10		
	M	F	T	M	F	T	M	F	T	M	F	T
53	-	0	0	-	-	-	-	-	-	-	-	-
54	-	0	0	-	-	-	-	-	-	-	-	-
55	-	0	0	-	-	-	-	-	-	-	-	-
56	-	0	0	-	-	-	-	-	-	-	-	-
57	-	0	0	-	-	-	-	-	-	-	-	-
58	-	0	0	-	-	-	-	-	-	-	-	-
59	-	0	0	-	-	-	-	-	-	-	-	-
60	-	0	0	-	-	-	-	-	-	-	-	-
61	-	0	0	-	-	-	-	-	-	-	-	-
62	-	0	0	-	-	-	-	-	-	-	-	-
63	-	0	0	-	-	-	-	-	-	-	-	-
64	-	0	0	-	-	-	-	-	-	-	-	-
65	-	0	0	-	-	-	-	-	-	-	-	-
66	-	0	0	-	-	-	-	-	-	-	-	-
67	-	0	0	-	-	-	-	-	-	-	-	-
68	-	0	0	-	-	-	-	-	-	-	-	-
69	-	0	0	-	-	-	-	-	-	-	-	-
70	-	0	0	-	-	-	-	-	-	-	-	-
71	-	0	0	-	-	-	-	-	-	-	-	-
72	-	1	1	-	-	-	-	-	-	-	-	-
TOTAL	19	29	48	234	285	519	261	343	604	42	47	89

Appendix table 4 (cont'd)

Set no. Fork length (cm)	11			TOTAL		
	M	F	T	M	F	T
10	-	-	-	1	-	1
11	-	-	-	0	-	0
12	-	-	-	0	-	0
13	-	-	-	0	1	1
14	2	1	3	3	3	6
15	2	4	6	3	6	9
16	16	8	24	19	12	31
17	13	13	26	33	28	61
18	12	17	29	52	67	123
19	13	21	34	82	92	175
20	11	13	24	116	116	232
21	5	5	10	119	121	240
22	3	7	10	68	113	181
23	1	1	2	79	71	150
24	-	-	-	51	50	101
25	-	-	-	35	23	58
26	-	-	-	20	19	39
27	-	-	-	16	22	38
28	-	-	-	33	37	70
29	-	-	-	44	33	77
30	-	-	-	35	42	77
31	-	-	-	28	45	73
32	-	-	-	51	45	96
33	-	-	-	31	56	87
34	-	-	-	33	53	86
35	-	-	-	31	55	86
36	-	-	-	31	47	78
37	-	-	-	12	33	45
38	-	-	-	8	32	40
39	-	-	-	1	22	23
40	-	-	-	1	6	7
41	-	-	-	2	7	9
42	-	-	-	0	3	3
43	-	-	-	0	8	8
44	-	-	-	0	2	2
45	-	-	-	0	1	1
46	-	-	-	0	3	3
47	-	-	-	0	2	2
48	-	-	-	0	5	5
49	-	-	-	1	1	2
50	-	-	-	0	0	0
51	-	-	-	1	2	3
52	-	-	-	2	4	6

Appendix table 4 (cont'd)

Set no. Fork length (cm)	11			TOTAL		
	M	F	T	M	F	T
53	-	-	-	0	5	5
54	-	-	-	4	1	5
55	-	-	-	2	3	5
56	-	-	-	1	0	1
57	-	-	-	-	4	4
58	-	-	-	-	3	3
59	-	-	-	-	3	3
60	-	-	-	-	1	1
61	-	-	-	-	3	3
62	-	-	-	-	1	1
63	-	-	-	-	6	6
64	-	-	-	-	2	2
65	-	-	-	-	0	0
66	-	-	-	-	0	0
67	-	-	-	-	0	0
68	-	-	-	-	0	0
69	-	-	-	-	0	0
70	-	-	-	-	0	0
71	-	-	-	-	0	0
72	-	-	-	-	1	1
TOTAL	78	90	168	1049	1321	2375

Appendix table 5. Pacific Hake length frequency. F/V MARWOOD, August 25-September 5, 1983

Set no.	2			3			4			5		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
20	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-	-	-	-	-
38	3	1	4	-	-	-	-	-	-	1	1	2
39	7	7	14	1	-	1	-	-	-	5	3	8
40	2	9	11	1	-	1	-	-	-	8	7	15
41	14	11	25	1	1	2	-	-	-	9	8	17
42	4	8	12	0	0	0	-	-	-	8	12	20
43	3	7	10	1	1	2	1	3	4	5	11	16
44	7	7	14	1	0	1	6	3	9	15	11	26
45	9	9	18	4	1	5	10	0	10	19	15	34
46	13	12	25	7	2	9	19	8	27	27	15	42
47	11	10	21	4	4	8	22	10	32	26	20	46
48	9	6	15	7	7	14	28	14	42	26	19	45
49	9	5	14	3	6	9	22	19	41	21	18	39
50	3	3	6	2	8	10	20	22	42	14	14	28
51	0	2	2	2	1	3	15	13	28	9	8	17
52	1	0	1	3	0	3	15	6	21	7	2	9
53	1	2	3	0	5	5	5	8	13	2	2	4
54	1	2	3	0	0	0	2	7	9	1	5	6
55	-	0	0	0	4	4	0	3	3	1	3	4
56	-	1	1	1	1	2	0	2	2	2	3	5
57	-	-	-	0	-	0	2	4	6	1	0	1
58	-	-	-	0	-	0	-	0	0	-	1	1
59	-	-	-	0	-	0	-	1	1	-	0	0
60	-	-	-	0	-	0	-	0	0	-	1	1
61	-	-	-	1	-	1	-	0	0	-	0	0
62	-	-	-	-	-	-	-	0	0	-	0	0

Appendix table 5 (cont'd)

Set no. Fork length (cm)	2			3			4			5		
	M	F	T	M	F	T	M	F	T	M	F	T
63	-	-	-	-	-	-	-	2	2	-	0	0
64	-	-	-	-	-	-	-	-	-	-	0	0
65	-	-	-	-	-	-	-	-	-	-	0	0
66	-	-	-	-	-	-	-	-	-	-	1	1
67	-	-	-	-	-	-	-	-	-	-	-	-
68	-	-	-	-	-	-	-	-	-	-	-	-
69	-	-	-	-	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	-	-	-	-	-	-
73	-	-	-	-	-	-	-	-	-	-	-	-
74	-	-	-	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	97	102	199	39	41	80	167	125	292	207	180	387

Appendix table 5 (cont'd)

Set no.	6			7			8			10		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
20	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-	-	-	-	-
37	-	-	-	1	-	1	1	-	1	-	-	-
38	2	2	4	1	-	1	3	4	7	1	3	4
39	9	6	15	2	5	7	13	9	22	1	3	4
40	12	12	24	7	9	16	20	16	36	2	5	7
41	20	24	44	5	14	19	23	27	50	4	5	9
42	21	26	47	9	18	27	17	24	41	2	6	8
43	20	22	42	12	8	20	19	15	34	8	3	11
44	21	26	47	18	13	31	16	19	35	9	8	17
45	25	19	44	24	15	39	26	13	39	21	10	31
46	21	19	40	29	22	51	13	13	26	31	15	46
47	14	14	28	25	11	36	7	19	26	29	18	47
48	19	13	32	21	24	45	13	13	26	25	26	51
49	7	21	28	19	17	36	7	8	15	21	23	44
50	8	14	22	10	16	26	14	10	24	13	19	32
51	3	9	12	6	5	11	1	6	7	9	11	20
52	1	2	3	5	4	9	0	7	7	5	12	17
53	1	8	9	0	6	6	4	0	4	3	8	11
54	1	5	6	3	3	6	1	3	4	1	7	8
55	0	0	0	0	0	0	2	0	2	0	2	2
56	0	1	1	0	1	1	-	2	2	1	0	1
57	0	0	0	1	2	3	-	0	0	-	3	3
58	1	0	1	0	0	0	-	1	1	-	1	1
59	-	0	0	1	1	2	-	0	0	-	0	0
60	-	1	1	-	0	0	-	0	0	-	1	1
61	-	0	0	-	0	0	-	0	0	-	0	0
62	-	1	1	-	0	0	-	0	0	-	0	0

Appendix table 5 (cont'd)

Set no.	6			7			8			10		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
63	-	0	0	-	0	0	-	2	2	-	0	0
64	-	0	0	-	1	1	-	0	0	-	0	0
65	-	1	1	-	0	0	-	0	0	-	0	0
66	-	-	-	-	1	1	-	1	1	-	0	0
67	-	-	-	-	-	-	-	-	-	-	0	0
68	-	-	-	-	-	-	-	-	-	-	0	0
69	-	-	-	-	-	-	-	-	-	-	0	0
70	-	-	-	-	-	-	-	-	-	-	0	0
71	-	-	-	-	-	-	-	-	-	-	0	0
72	-	-	-	-	-	-	-	-	-	-	0	0
73	-	-	-	-	-	-	-	-	-	-	1	1
74	-	-	-	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	206	246	452	199	196	395	200	212	412	186	190	376

Appendix table 5 (cont'd)

Set no. Fork length (cm)	15			16			17			18		
	M	F	T	M	F	T	M	F	T	M	F	T
20	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	1	1	-	-	-	-	-	-
30	-	-	-	-	0	0	-	-	-	-	-	-
31	-	-	-	-	0	0	-	-	-	-	-	-
32	-	-	-	-	0	0	-	-	-	-	-	-
33	-	-	-	-	0	0	1	-	1	-	-	-
34	-	-	-	-	0	0	0	-	0	-	-	-
35	1	-	1	-	0	0	1	-	1	-	-	-
36	3	3	6	2	1	3	2	2	4	1	1	2
37	13	12	25	2	2	4	12	3	15	2	4	6
38	38	37	75	8	3	11	26	27	53	14	10	24
39	52	63	115	22	21	43	30	36	66	29	20	49
40	51	96	147	26	41	67	27	39	66	41	30	71
41	47	56	103	30	42	72	19	34	53	32	31	63
42	12	27	39	22	37	59	8	13	21	20	33	53
43	12	18	30	16	21	37	6	9	15	15	20	35
44	6	2	8	11	10	21	9	8	17	12	13	25
45	11	6	17	17	10	27	5	5	10	11	11	22
46	13	4	17	22	10	32	6	2	8	17	8	25
47	7	4	11	21	12	33	5	5	10	10	8	18
48	4	4	8	16	6	22	9	5	14	12	8	20
49	1	2	3	14	9	23	7	6	13	6	6	12
50	2	1	3	10	6	16	4	2	6	6	2	8
51	1	4	5	8	3	11	2	3	5	3	2	5
52	-	3	3	7	11	18	1	1	2	4	2	6
53	-	2	2	0	3	3	2	0	2	2	1	3
54	-	0	0	0	0	0	2	2	4	0	3	3
55	-	0	0	0	0	0	-	1	1	1	1	2
56	-	2	2	0	0	0	-	1	1	-	0	0
57	-	1	1	1	1	2	-	0	0	-	0	0
58	-	-	-	0	-	0	-	1	1	-	0	0
59	-	-	-	0	-	0	-	0	0	-	0	0
60	-	-	-	0	-	0	-	1	1	-	0	0
61	-	-	-	0	-	0	-	0	0	-	0	0
62	-	-	-	0	-	0	-	0	0	-	0	0

Appendix table 5 (cont'd)

Set no.	15			16			17			18		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
63	-	-	-	0	-	0	-	0	0	-	0	0
64	-	-	-	0	-	0	-	0	0	-	0	0
65	-	-	-	1	-	1	-	2	2	-	0	0
66	-	-	-	-	-	-	-	-	-	-	0	0
67	-	-	-	-	-	-	-	-	-	-	1	1
68	-	-	-	-	-	-	-	-	-	-	-	-
69	-	-	-	-	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	-	-	-	-	-	-
73	-	-	-	-	-	-	-	-	-	-	-	-
74	-	-	-	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	274	347	621	256	250	506	184	208	392	238	215	453

Appendix table 5 (cont'd)

Set no. Fork length (cm)	19			20			21			22		
	M	F	T	M	F	T	M	F	T	M	F	T
20	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	1	-	1	-	-	-	-	-	-
33	-	-	-	0	-	0	-	-	-	-	-	-
34	-	-	-	0	-	0	-	-	-	-	-	-
35	1	-	1	0	-	0	-	-	-	-	-	-
36	4	1	5	1	1	2	-	-	-	-	-	-
37	6	3	9	5	5	10	-	1	1	-	-	-
38	13	17	30	17	3	20	2	4	6	-	-	-
39	27	28	55	24	15	39	8	5	13	-	-	-
40	26	33	59	24	22	46	5	7	12	-	-	-
41	23	30	53	18	13	31	8	12	20	-	-	-
42	23	23	46	20	13	33	10	9	19	-	-	-
43	3	9	12	10	12	22	3	8	11	-	-	-
44	3	7	10	7	8	15	5	10	15	1	-	1
45	2	0	2	13	7	20	13	7	20	1	1	2
46	4	2	6	15	12	27	19	12	31	5	0	5
47	2	3	5	9	10	19	22	15	37	5	1	6
48	0	0	0	9	9	18	20	9	29	7	0	7
49	1	0	1	5	15	20	15	9	24	8	5	13
50	0	1	1	4	12	16	10	10	20	11	0	11
51	1	-	1	3	11	14	4	15	19	13	9	22
52	-	-	-	0	7	7	5	16	21	11	9	20
53	-	-	-	2	2	4	2	11	13	14	12	26
54	-	-	-	2	7	9	2	7	9	6	17	23
55	-	-	-	1	4	5	1	6	7	2	27	29
56	-	-	-	1	4	5	0	5	5	7	18	25
57	-	-	-	1	1	2	0	3	3	2	14	17
58	-	-	-	-	2	2	0	4	4	3	21	24
59	-	-	-	-	0	0	1	2	3	1	17	18
60	-	-	-	-	1	1	0	4	4	0	15	15
61	-	-	-	-	2	2	0	2	2	2	12	14
62	-	-	-	-	1	1	0	1	1	0	16	16

Appendix table 5 (cont'd)

Set no.	19			20			21			22		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
63	-	-	-	-	1	1	0	0	0	1	17	18
64	-	-	-	-	0	0	0	3	3	1	15	16
65	-	-	-	-	2	2	2	2	4	1	16	17
66	-	-	-	-	0	0	-	4	4	-	10	10
67	-	-	-	-	0	0	-	0	0	-	9	9
68	-	-	-	-	0	0	-	1	1	-	4	4
69	-	-	-	-	0	0	-	0	0	-	8	8
70	-	-	-	-	0	0	-	0	0	-	3	3
71	-	-	-	-	2	2	-	1	1	-	3	3
72	-	-	-	-	0	0	-	1	1	-	1	1
73	-	-	-	-	1	1	-	-	-	-	1	1
74	-	-	-	-	-	-	-	-	-	-	2	2
75	-	-	-	-	-	-	-	-	-	-	1	1
TOTAL	139	157	296	192	205	397	157	206	363	102	284	387

Appendix table 5 (cont'd)

Set no. / Fork length (cm)	24			25			26			28		
	M	F	T	M	F	T	M	F	T	M	F	T
20	-	1	1	-	-	-	-	-	-	-	-	-
21	-	0	0	-	-	-	-	-	-	-	-	-
22	-	0	0	-	-	-	-	-	-	-	-	-
23	-	0	0	-	-	-	-	-	-	-	-	-
24	-	0	0	-	-	-	-	-	-	-	-	-
25	-	0	0	-	-	-	-	-	-	-	-	-
26	-	0	0	-	-	-	-	-	-	-	-	-
27	-	0	0	-	-	-	-	-	-	-	-	-
28	-	0	0	-	-	-	-	-	-	-	-	-
29	-	0	0	-	-	-	-	-	-	-	-	-
30	-	0	0	-	-	-	-	-	-	-	-	-
31	-	0	0	-	-	-	-	-	-	-	-	-
32	-	0	0	-	-	-	-	-	-	-	-	-
33	-	0	0	-	-	-	-	-	-	-	-	-
34	-	0	0	1	-	1	-	-	-	-	-	-
35	-	0	0	0	-	0	-	-	-	-	-	-
36	-	0	0	0	-	0	-	-	-	-	-	-
37	1	1	2	0	1	1	1	-	1	1	3	4
38	3	1	4	0	1	1	2	4	6	8	4	12
39	4	5	9	1	0	1	6	4	10	8	8	16
40	3	7	10	0	0	0	12	6	18	17	20	37
41	6	4	10	1	1	2	13	14	27	19	16	35
42	1	2	3	0	0	0	4	12	16	11	15	26
43	1	1	2	0	2	2	6	11	17	11	8	19
44	2	0	2	1	1	2	8	9	17	9	6	15
45	6	3	9	4	2	6	8	8	16	9	6	15
46	6	7	13	2	3	5	13	16	29	22	11	33
47	11	3	14	4	4	8	10	11	21	27	6	33
48	10	6	16	12	3	15	7	10	17	23	13	36
49	10	5	15	15	5	20	7	9	16	27	23	50
50	2	4	6	11	9	20	6	4	10	25	13	38
51	1	3	4	6	6	12	5	11	16	28	7	35
52	5	5	10	9	9	18	1	5	6	16	11	27
53	4	1	5	3	4	7	1	4	5	10	16	26
54	1	1	2	1	7	8	-	6	6	10	7	17
55	-	1	1	1	3	4	-	2	2	1	3	4
56	-	2	2	3	1	4	-	1	1	1	4	5
57	-	1	1	1	5	6	-	3	3	0	5	5
58	-	-	-	-	2	2	-	3	3	1	1	2
59	-	-	-	-	0	0	-	1	1	-	1	1
60	-	-	-	-	1	1	-	2	2	-	2	2
61	-	-	-	-	-	-	-	0	0	-	0	0
62	-	-	-	-	-	-	-	1	1	-	0	0

Appendix table 5 (cont'd)

Set no.	24			25			26			28		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
63	-	-	-	-	-	-	-	0	0	-	1	1
64	-	-	-	-	-	-	-	1	1	-	-	-
65	-	-	-	-	-	-	-	-	-	-	-	-
66	-	-	-	-	-	-	-	-	-	-	-	-
67	-	-	-	-	-	-	-	-	-	-	-	-
68	-	-	-	-	-	-	-	-	-	-	-	-
69	-	-	-	-	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	-	-	-	-	-	-
73	-	-	-	-	-	-	-	-	-	-	-	-
74	-	-	-	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	77	64	141	76	70	146	110	158	268	284	210	494

Appendix table 5 (cont'd)

Set no.	29			30			31			32		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
20	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-	-	-	-	-
36	2	2	4	-	-	-	-	-	-	-	-	-
37	2	6	8	2	5	7	-	-	-	-	-	-
38	13	9	22	5	7	12	-	-	-	-	-	-
39	25	21	46	12	9	21	-	1	1	-	-	-
40	26	27	53	22	15	37	4	1	5	-	-	-
41	20	26	46	22	21	43	5	4	9	-	1	1
42	8	24	32	13	20	33	4	4	8	-	0	0
43	9	16	25	15	14	29	6	3	9	-	0	0
44	18	9	27	20	11	31	9	1	10	-	0	0
45	18	10	28	17	12	29	12	12	24	-	0	0
46	27	9	36	26	12	38	19	9	28	-	1	1
47	13	21	34	26	13	39	11	13	24	1	3	4
48	14	11	25	13	9	22	14	18	32	1	1	2
49	6	5	11	9	11	20	10	18	28	3	9	12
50	4	0	4	6	5	11	12	5	17	4	9	13
51	3	4	7	2	8	10	8	7	15	4	9	13
52	1	3	4	2	4	6	6	3	9	2	17	19
53	1	1	2	0	0	0	2	6	8	5	17	22
54	1	1	2	1	1	2	2	3	5	1	11	12
55	0	0	0	-	1	1	0	1	1	2	12	14
56	0	1	1	-	1	1	1	4	5	2	6	8
57	1	-	1	-	0	0	-	1	1	0	13	13
58	-	-	-	-	0	0	-	-	-	0	11	11
59	-	-	-	-	1	1	-	-	-	2	12	14
60	-	-	-	-	-	-	-	-	-	1	13	14
61	-	-	-	-	-	-	-	-	-	-	9	9
62	-	-	-	-	-	-	-	-	-	-	24	24

Appendix table 5 (cont'd)

Set no.	29			30			31			32		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
63	-	-	-	-	-	-	-	-	-	-	12	12
64	-	-	-	-	-	-	-	-	-	-	17	17
65	-	-	-	-	-	-	-	-	-	-	11	11
66	-	-	-	-	-	-	-	-	-	-	7	7
67	-	-	-	-	-	-	-	-	-	-	2	2
68	-	-	-	-	-	-	-	-	-	-	3	3
69	-	-	-	-	-	-	-	-	-	-	4	4
70	-	-	-	-	-	-	-	-	-	-	2	2
71	-	-	-	-	-	-	-	-	-	-	0	0
72	-	-	-	-	-	-	-	-	-	-	1	1
73	-	-	-	-	-	-	-	-	-	-	-	-
74	-	-	-	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	212	206	418	213	180	393	125	114	239	28	237	265

Appendix table 5 (cont'd)

Set no.	33			35			36			37		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
20	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-	-	-	-	-
34	-	-	-	-	1	1	-	-	-	-	-	-
35	-	-	-	-	1	1	-	-	-	-	-	-
36	-	-	-	-	0	0	1	-	1	-	-	-
37	-	-	-	-	0	0	0	1	1	-	-	-
38	-	-	-	-	1	1	0	0	0	4	7	11
39	-	-	-	1	2	3	2	0	2	8	5	13
40	-	-	-	4	1	5	3	1	4	4	4	8
41	1	-	1	2	2	4	0	0	0	8	13	21
42	0	3	3	3	4	7	1	2	3	7	13	20
43	1	3	4	1	2	3	3	2	5	10	9	19
44	8	4	12	6	9	15	4	5	9	10	6	16
45	9	3	12	14	7	21	9	4	13	10	6	16
46	10	10	20	25	12	37	8	7	15	12	7	19
47	18	13	31	28	18	46	19	9	28	13	11	24
48	15	21	36	37	27	64	16	18	34	9	8	17
49	16	17	33	37	21	58	20	13	33	4	5	9
50	15	18	33	23	25	48	16	18	34	6	2	8
51	11	17	28	20	21	41	12	11	23	5	6	11
52	14	16	30	14	26	40	7	14	21	2	2	4
53	7	19	26	8	12	20	14	7	21	1	1	2
54	2	11	13	11	14	25	5	6	11	-	4	4
55	2	12	14	8	9	17	6	8	14	-	0	0
56	3	8	11	1	13	14	5	10	15	-	0	0
57	2	8	10	3	7	10	0	6	6	-	0	0
58	3	11	14	1	6	7	0	0	0	-	1	1
59	2	6	8	1	2	3	1	1	2	-	0	0
60	0	6	6	-	0	0	-	1	1	-	0	0
61	1	3	4	-	2	2	-	1	1	-	0	0
62	0	5	5	-	2	2	-	0	0	-	1	1

Appendix table 5 (cont'd)

Set no.	33			35			36			37		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
63	1	4	5	-	3	3	-	0	0	-	0	0
64	-	7	7	-	-	-	-	0	0	-	0	0
65	-	3	3	-	-	-	-	1	1	-	1	1
66	-	4	4	-	-	-	-	0	0	-	-	-
67	-	2	2	-	-	-	-	0	0	-	-	-
68	-	0	0	-	-	-	-	1	1	-	-	-
69	-	0	0	-	-	-	-	0	0	-	-	-
70	-	2	2	-	-	-	-	0	0	-	-	-
71	-	-	-	-	-	-	-	1	1	-	-	-
72	-	-	-	-	-	-	-	0	0	-	-	-
73	-	-	-	-	-	-	-	0	0	-	-	-
74	-	-	-	-	-	-	-	1	1	-	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	141	236	377	248	250	498	152	149	301	113	112	225

Appendix table 5 (cont'd)

Set no. Fork length (cm)	38			39			40			TOTAL		
	M	F	T	M	F	T	M	F	T	M	F	T
20	-	-	-	-	-	-	-	-	-	-	1	1
21	-	-	-	-	-	-	-	-	-	-	0	0
22	-	-	-	-	-	-	-	-	-	-	0	0
23	-	-	-	-	-	-	-	-	-	-	0	0
24	-	-	-	-	-	-	-	-	-	-	0	0
25	-	-	-	-	-	-	-	-	-	-	0	0
26	-	-	-	-	-	-	-	-	-	-	0	0
27	-	-	-	-	-	-	-	-	-	-	0	0
28	-	-	-	-	-	-	-	-	-	-	0	0
29	-	-	-	-	-	-	-	-	-	-	1	1
30	-	-	-	-	-	-	-	-	-	-	0	0
31	-	-	-	-	-	-	-	-	-	-	0	0
32	-	-	-	-	-	-	-	-	-	1	0	1
33	-	-	-	-	-	-	-	-	-	1	0	1
34	-	-	-	-	-	-	-	-	-	1	1	2
35	-	-	-	-	-	-	-	-	-	3	1	4
36	-	-	-	-	-	-	-	-	-	16	11	27
37	-	-	-	-	-	-	-	1	1	49	48	97
38	-	-	-	-	-	-	-	0	0	164	146	310
39	1	-	1	1	-	1	-	0	0	299	276	575
40	0	-	0	0	1	1	2	1	3	349	410	759
41	0	-	0	1	0	1	0	4	4	351	414	765
42	0	-	0	2	1	3	4	2	6	234	351	585
43	1	-	1	1	2	3	6	4	10	205	244	449
44	2	-	2	0	0	0	4	4	8	248	210	458
45	9	1	10	3	0	3	18	8	26	357	211	568
46	12	5	17	9	1	10	14	16	30	466	282	748
47	14	14	28	7	7	14	18	12	30	439	322	761
48	17	14	31	24	12	36	13	26	39	450	360	810
49	20	8	28	30	25	55	12	24	36	392	367	759
50	24	14	38	25	24	49	5	7	12	315	297	612
51	19	15	34	42	31	73	10	6	16	256	264	520
52	19	14	33	27	37	64	5	3	8	195	251	446
53	11	17	28	19	23	42	0	6	6	124	204	328
54	5	10	15	20	23	43	2	5	7	84	178	262
55	5	12	17	7	20	27	-	1	1	40	136	176
56	2	9	11	1	15	16	-	0	0	31	116	147
57	0	12	12	3	7	10	-	1	1	18	98	117
58	0	3	3	0	8	8	-	-	-	9	77	86
59	2	2	4	2	5	7	-	-	-	13	52	65
60	0	3	3	0	3	3	-	-	-	1	55	56
61	1	1	2	1	5	6	-	-	-	6	37	43
62	-	0	0	-	3	3	-	-	-	0	55	55

Appendix table 5 (cont'd)

Set no. Fork length (cm)	38			39			40			TOTAL		
	M	F	T	M	F	T	M	F	T	M	F	T
63	-	0	0	-	1	1	-	-	-	2	43	45
64	-	1	1	-	1	1	-	-	-	1	46	47
65	-	1	1	-	-	-	-	-	-	4	40	44
66	-	0	0	-	-	-	-	-	-	-	28	28
67	-	1	1	-	-	-	-	-	-	-	15	15
68	-	0	0	-	-	-	-	-	-	-	9	9
69	-	1	1	-	-	-	-	-	-	-	13	13
70	-	0	0	-	-	-	-	-	-	-	7	7
71	-	1	1	-	-	-	-	-	-	-	8	8
72	-	-	-	-	-	-	-	-	-	-	3	3
73	-	-	-	-	-	-	-	-	-	-	3	3
74	-	-	-	-	-	-	-	-	-	-	3	3
75	-	-	-	-	-	-	-	-	-	-	1	1
TOTAL	164	159	323	225	255	480	113	131	244	5124	5695	10820

Appendix table 5 (cont'd)

Set no. / Fork length (cm)	Total CDN waters			Total U.S. waters		
	M	F	T	M	F	T
20	-	-	-	-	1	1
21	-	-	-	-	0	0
22	-	-	-	-	0	0
23	-	-	-	-	0	0
24	-	-	-	-	0	0
25	-	-	-	-	0	0
26	-	-	-	-	0	0
27	-	-	-	-	0	0
28	-	-	-	-	0	0
29	-	-	-	-	1	1
30	-	-	-	-	0	0
31	-	-	-	-	0	0
32	-	-	-	1	0	1
33	-	-	-	1	0	1
34	-	1	1	1	0	1
35	-	1	1	3	0	3
36	3	2	5	13	9	22
37	6	13	19	43	35	78
38	33	35	68	131	111	242
39	88	71	159	211	205	416
40	117	109	226	232	301	533
41	135	161	296	216	253	469
42	103	167	270	131	184	315
43	122	125	247	33	119	202
44	174	136	310	74	74	148
45	257	145	402	100	66	166
46	322	195	517	144	87	231
47	306	240	546	133	82	215
48	321	287	608	129	73	202
49	276	273	549	116	94	210
50	224	233	457	91	64	155
51	181	190	371	75	74	149
52	136	172	308	59	79	138
53	84	148	232	40	56	96
54	60	121	181	24	57	81
55	33	88	121	7	48	55
56	19	78	97	12	38	50
57	13	64	77	5	34	40
58	5	43	48	4	34	38
59	11	31	42	2	21	23
60	1	29	30	0	26	26
61	4	21	25	2	16	18
62	0	36	36	0	19	19

Appendix table 5 (cont'd)

Set no.	Total CDN waters			Total U.S. waters		
Fork length (cm)	M	F	T	M	F	T
63	1	24	25	1	19	20
64	-	27	27	1	19	20
65	-	18	18	4	22	26
66	-	14	14	-	14	14
67	-	5	5	-	10	10
68	-	4	4	-	5	5
69	-	5	5	-	8	8
70	-	4	4	-	3	3
71	-	2	2	-	6	6
72	-	1	1	-	2	2
73	-	1	1	-	2	2
74	-	1	1	-	2	2
75	-	-	-	-	1	1
TOTAL	3035	3321	6356	2089	2374	4464

Appendix table 6. Walleye Pollock length frequency. R/V G.B. REED, August 15-21, 1983.

Set no.	4			5			9			10		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
8	-	-	-	-	-	-	-	-	-	2	-	2
9	-	1	1	2	1	3	-	-	-	0	-	0
10	2	4	6	1	2	3	-	-	-	1	1	2
11	10	8	18	4	5	9	-	-	-	0	0	0
12	7	8	15	6	8	14	-	-	-	0	0	0
13	5	7	12	3	2	5	-	-	-	0	0	0
14	5	0	5	0	0	0	-	-	-	0	0	0
15	0	1	1	0	0	0	-	-	-	0	0	0
16	0	0	0	0	0	0	-	-	-	0	0	0
17	0	0	0	0	1	1	-	-	-	0	0	0
18	0	0	0	0	0	0	-	-	-	0	2	2
19	0	1	1	1	0	1	-	-	-	1	0	1
20	0	1	1	2	0	2	-	-	-	0	1	1
21	2	2	4	2	4	6	-	-	-	1	0	1
22	5	4	9	3	4	7	-	-	-	2	2	4
23	12	6	18	5	6	11	-	-	-	-	-	-
24	8	6	14	6	3	9	-	-	-	-	-	-
25	8	6	14	6	1	7	-	-	-	-	-	-
26	7	1	8	5	1	6	-	-	-	-	-	-
27	2	3	5	0	-	0	-	-	-	-	-	-
28	1	0	1	0	-	0	-	-	-	-	-	-
29	0	0	0	0	-	0	-	-	-	-	-	-
30	2	0	2	0	-	0	1	-	1	-	-	-
31	5	2	7	0	-	0	-	-	0	-	-	-
32	6	1	7	0	-	0	-	-	0	-	-	-
33	3	1	4	0	-	0	-	-	0	-	-	-
34	2	2	4	1	-	1	-	-	0	-	-	-
35	1	1	2	-	-	-	-	-	0	-	-	-
36	-	1	1	-	-	-	-	-	0	-	-	-
37	-	0	0	-	-	-	-	-	0	-	-	-
38	-	0	0	-	-	-	-	-	0	-	-	-
39	-	1	1	-	-	-	-	-	0	-	-	-
40	-	-	-	-	-	-	-	1	1	-	-	-
41	-	-	-	-	-	-	-	0	0	-	-	-
42	-	-	-	-	-	-	-	0	0	-	-	-
43	-	-	-	-	-	-	-	1	1	-	-	-
TOTAL	93	68	161	47	38	85	1	2	3	7	6	13

Appendix table 6 (cont'd)

Set no. Fork length (cm)	11			TOTAL		
	M	F	T	M	F	T
8	1	-	1	3	-	3
9	0	2	2	2	4	6
10	0	1	1	4	8	12
11	1	0	1	15	13	28
12	0	0	0	13	16	29
13	0	0	0	8	9	17
14	0	0	0	5	0	5
15	0	0	0	0	1	1
16	0	0	0	0	0	0
17	0	0	0	0	1	1
18	0	1	1	0	3	3
19	3	0	3	5	1	6
20	4	5	9	6	7	13
21	3	3	6	8	9	17
22	1	6	7	11	16	27
23	0	3	3	17	15	32
24	1	0	1	15	9	24
25	-	2	2	14	9	23
26	-	0	0	12	2	14
27	-	0	0	2	3	5
28	-	0	0	1	0	1
29	-	1	1	0	1	1
30	-	-	-	3	0	3
31	-	-	-	5	2	7
32	-	-	-	6	1	7
33	-	-	-	3	1	4
34	-	-	-	3	2	5
35	-	-	-	1	1	2
36	-	-	-	-	1	1
37	-	-	-	-	0	0
38	-	-	-	-	0	0
39	-	-	-	-	1	1
40	-	-	-	-	1	1
41	-	-	-	-	0	0
42	-	-	-	-	0	0
43	-	-	-	-	1	1
TOTAL	14	24	38	162	138	300

Appendix table 7. Walleye Pollock length frequency. F/V MARWOOD, August 25–September 5,1983.

Set no.	5			6			7			8		
Fork length (cm)	M	F	T	M	F	T	M	F	T	M	F	T
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	1	-	1
33	-	-	-	-	-	-	-	-	-	1	-	1
34	-	-	-	-	-	-	-	-	-	0	-	0
35	-	-	-	2	-	2	1	-	1	3	2	5
36	-	-	-	0	-	0	1	5	6	2	1	3
37	2	-	2	1	1	2	1	0	1	2	3	5
38	0	-	0	1	1	2	0	1	1	1	2	3
39	0	-	0	0	0	0	1	3	4	5	1	6
40	0	1	1	1	2	3	4	2	6	2	0	2
41	1	0	1	3	0	3	3	0	3	5	0	5
42	0	0	0	0	2	2	4	1	5	1	0	1
43	2	0	2	1	0	1	3	0	3	2	3	5
44	-	0	0	2	0	2	5	3	8	0	1	1
45	-	2	2	-	2	2	0	7	7	1	1	2
46	-	0	0	-	1	1	2	4	6	2	3	5
47	-	1	1	-	0	0	0	1	1	0	1	1
48	-	0	0	-	0	0	2	1	3	0	-	0
49	-	1	1	-	1	1	-	1	1	1	-	1
50	-	1	1	-	0	0	-	1	1	1	-	1
51	-	-	-	-	1	1	-	3	3	1	-	1
52	-	-	-	-	-	-	-	1	1	-	-	-
53	-	-	-	-	-	-	-	-	-	-	-	-
54	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	5	6	11	11	11	22	27	34	61	31	18	49

Appendix table 7 (cont'd)

Set no. Fork length (cm)	25			33			38			TOTAL		
	M	F	T	M	F	T	M	F	T	M	F	T
25	-	-	-	1	-	1	-	-	-	1	-	1
26	-	-	-	0	-	0	-	-	-	0	-	0
27	-	-	-	0	1	1	-	-	-	0	1	1
28	-	-	-	0	0	0	-	-	-	0	0	0
29	-	1	1	0	0	0	-	-	-	0	1	1
30	-	0	0	0	0	0	-	-	-	0	0	0
31	-	1	1	0	0	0	-	-	-	0	1	1
32	1	1	2	1	1	2	-	-	-	3	2	5
33	4	1	5	0	0	0	-	-	-	5	1	6
34	6	7	13	3	1	4	-	-	-	9	8	17
35	9	9	18	3	2	5	1	-	1	19	13	32
36	13	15	28	2	6	8	0	1	1	18	28	46
37	9	16	25	5	7	12	2	0	2	22	27	49
38	2	7	9	2	9	11	1	2	3	7	22	29
39	4	5	9	3	8	11	0	0	0	13	17	30
40	0	1	1	0	1	1	2	0	2	9	7	16
41	0	1	1	4	0	4	1	0	1	17	1	18
42	0	2	2	1	1	2	0	1	1	6	7	13
43	3	0	3	4	0	4	0	0	0	15	3	18
44	1	0	1	1	3	4	0	0	0	9	7	16
45	-	0	0	3	2	5	0	1	1	4	15	19
46	-	0	0	1	1	2	1	1	2	6	10	16
47	-	0	0	0	4	4	2	1	3	2	8	10
48	-	0	0	1	2	3	-	4	4	3	7	10
49	-	0	0	0	6	6	-	1	1	1	10	11
50	-	0	0	1	5	6	-	1	1	2	8	10
51	-	0	0	-	1	1	-	0	0	1	5	6
52	-	0	0	-	1	1	-	2	2	-	4	4
53	-	1	1	-	2	2	-	-	-	-	3	3
54	-	-	-	-	1	1	-	-	-	-	1	1
TOTAL	52	68	120	36	65	101	10	15	25	172	217	389

Appendix table 8. Spiny dogfish length frequency. R/V G.B. REED, August 15-21, 1983.

Total length (cm)	Set no. 7		
	M	F	T
30	1	-	1
31	1	-	1
32	0	-	0
47	1	-	1
48	0	-	0
49	0	1	1
50	0	0	0
57	0	0	0
64	0	0	0
65	0	0	0
66	0	0	0
67	0	0	0
88	0	1	1
89	0	0	0
90	0	2	2
91	0	1	1
92	1	2	3
93	-	1	1
94	-	3	3
95	-	3	3
96	-	4	4
97	-	4	4
98	-	3	3
99	-	12	12
100	-	4	4
101	-	5	5
102	-	8	8
103	-	7	7
104	-	6	6
105	-	3	3
106	-	2	2
107	-	3	3
108	-	5	5
109	-	1	1
110	-	2	2
111	-	2	2
Total	4	94	98

Appendix table 9. Bocaccio Rockfish length frequency. R/V G.B. REED, August 15-21, 1983.

Fork length (cm)	Set no. 7		
	M	F	T
39	-	1	1
40	-	0	0
41	-	0	0
42	-	0	0
43	2	1	3
44	1	0	1
45	4	2	6
46	3	2	5
47	10	3	13
48	8	4	12
49	8	9	17
50	10	15	25
51	5	8	13
52	4	1	5
53	2	4	6
54	4	3	7
55	2	0	2
56	3	1	4
57	8	1	9
58	5	2	7
59	7	1	8
60	10	0	10
61	11	1	12
62	8	0	8
63	2	1	3
64	5	0	5
65	-	2	2
66	-	0	0
67	-	0	0
68	-	0	0
69	-	0	0
70	-	1	1
71	-	1	1
Total	122	64	185